OKLAHOMA STATE UNIVERSITY

VOLUNTEERING WITH GLOBAL MEDICAL BRIGADES IN DARIEN, PANAMA; LOOKING AT THE BEVERAGE CONSUMPTION OF THE LOCAL CITIZENS

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Pursuing a degree in Human Nutrition/ Pre-Medical Sciences (BS)

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Submitted to the Faculty of the

Honors College of

Oklahoma State University

in partial fulfillment of

the requirements for the

Honors College Degree and the

College of Human Sciences

Department of Nutritional Sciences Awards

May 2019

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ABSTRACT

Global Medical Brigades is a primarily student-led organization which brings aid to various communities in Central America and Africa. My Global Brigade journey began in the fall of 2016, with my first trip being in the summer of 2017 to Honduras. I fell in love with the organization and the experience, and thus decided to go again to Panama the following summer. A big issue I noticed in Honduras was the prevalence of overweight people, as well as the rate of consumption of soft drinks; therefore, when I went to Panama on my second brigade, I wanted to conduct research to better understand the problems of overweight/obesity and soft drink consumption. After some research I found that urban peoples consume more high energy food and drinks than rural peoples due to having more money, but there is still cause for concern in the rural areas. My research is only a starting point in what will hopefully lead to actual dietary counseling and intervention to help the overweight and obesity issue that is present in that area.

Introduction

Global Brigades is an organization that is geared toward helping various rural communities in Honduras, Panama, and Ghana. The founders of Global Brigades eventually realized that the traditional way of helping communities (entering the community, offering aid, and once they leave the conditions return to the way they were) was not lasting within the community. Therefore, Global Brigades' mission is to produce sustainable communities (History). They do this by bringing multiple types of brigades into communities where the goal is to not only provide immediate relief, but to make them sustainable so that they will no longer need assistance.

My experiences with Global Brigades began in May of 2017, when I traveled to Honduras on a medical brigade. I was incredibly humbled by the entire experience. I was able to see firsthand how poorly the citizens of that area were living, but also how happy they were. This made being able to help them in the clinic much more rewarding. The amazing experience prompted me to immediately sign up for a subsequent medical brigade in August 2018.

Just like in the United States, Central America (e.g. Honduras and Panama) has incredibly high rates of obesity and diabetes (Sasson, Stoddard). It is understood that the eating habits of Americans are a major contributor to the high rates of obesity. While I was in Honduras I noticed that, in addition to the generally high calorie food habits of people in that region, many people were drinking soda instead of water. So, the purpose of this study was to gather data on my medical brigade experience in Panama to determine if there is a potential correlation between their beverage consumption habits and their prevalence of obesity.

I. Global Brigades

Global Brigades was originally founded in 2003 by two college students, Duffy Casey and Shital Chauhan from Marquette University, whom after leading a team of doctors and fellow students to Honduras in partnership with a local aid group, Sociedad Amigos de los Niños, were inspired to keep the dream alive (History). After returning to the United States they founded a nonprofit by the name of Global Medical Relief with help from fellow students Arman Nadershahi, Liran Amir and Jeff Bodle. Throughout the next few years, Global Medical Relief began to grow and develop, with Duffy moving to Honduras and other co-founders being brought in to help lift the organization off of the ground.

By 2005 the organization had expanded to University of California at Los Angeles, the University of Michigan, and University of Southern California; and by 2006 it had fifteen chapters at various universities. Throughout the years, Global Brigades (what was once named Global Medical Relief) has grown and developed immensely. In 2011, Global Brigades had expanded globally, with chapters in Canada and the United Kingdom. Because it was so large, the organization decided it would be best to unify the existing international entities under one committee. Hence, representatives from each country would meet on a regular basis to discuss what the future of the organization would look like. It was decided to forego the addition of any more chapters, and to focus solely on the existing ones in order to develop the holistic model (including only health and sustainable development work) that was currently in place. In 2016, Global Brigades developed the Empowered 100 movement, which is a five-year plan to make 100 communities sustainable and able to support themselves.

The Empowered 100 plan embodies the platform that Global Brigades stands on: sustainability. Global Brigades recognizes that many volunteer organizations go to communities throughout the world and help. However, these organizations only help for the time they are in

country. As soon as they leave, these places return to the conditions that brought the relief to them in the first place. Global Brigades, through its multiple different types of service (medical, public health, financial, legal, etc.), work to help communities become sustainable so that no further aid will be necessary.

II. My Experience with Global Brigades

As a sophomore in college in 2017, I really began to think that medicine was the career for me; however, I was still having doubts. I was looking for something that would help me finally decide if medicine was what I wanted, so when I came across Oklahoma State's chapter of Global Medical Brigades, I decided to attend an information session. I was initially intrigued, and decided to attend a few more. At this point, the end of the fall semester was nearing, and the group needed final decisions on who was going and who was not. After much deliberation and discussion with friends and family, I decided to take the plunge and sign up. I was ecstatic after I finally made the decision to go.

My first brigade was to Honduras in May 2017. I was fairly shocked at how developed the capital city was as I flew into the airport. The first thing I saw out of the plane window was a Domino's Pizza. I was a little confused because I thought that we were there to help an incredibly underserved area. However, as soon as we boarded the van to take us to our compound, I learned of the true situation in Honduras. Despite this fact, our accommodations were surprisingly nice. Granted, I was in a small room with four bunk beds, one cold shower, and sharing four toilets (of which nobody was allowed to flush toilet paper down) with the entire compound. I was happy we had the bunk beds, a fan, and clean sheets every day.

My experience with the brigade was amazing. Our chapter brought over forty people on the brigade, so we had more than enough help to go around. Before we started our clinic, we went to a community that already had a brigade, and did a post-brigade survey. Walking around this area had me completely stunned. I grew up in the country, so I know what it is like to live without power and running water, but I had never imagined such a thing being the everyday norm for entire communities. I will never forget the types of "houses" that entire families lived in, and the holes in the ground they called bathrooms. We finished with our survey, and while we were waiting to head back to the compound, a few of us began playing soccer with some children from one of the homes that we had just visited. I quickly learned that playing with the children would be one of my favorite parts of the brigade. Each evening we were there, we would always get a few hours of down time, and during this time we all played card games and a few of us stayed up late just talking and getting to know each other. It was okay that we stayed up so late, because we had three-hour van ride, albeit across pothole-ridden dirt roads, to the community every morning. Needless to say, we definitely napped on the way there.

The clinic started off, at least for me, a bit hectic as I had no idea exactly what I was supposed to be doing; however, I quickly caught on. Throughout the clinic days, we rotated through various stations, with me going to triage, education, and consultation. Triage was very intimidating for me because we were taking patient histories and vitals, which would normally be very easy, except I could not speak any Spanish. Luckily, we had fantastic translators that wrote out yes-or-no questions for us to read off to the patients. After a while, I had pretty much memorized the questions in Spanish and barely had to use the paper anymore.

Consultation was very relaxed, as all we were doing was shadowing the physicians that were helping with the clinic. There was an older woman, probably in her sixties, who brought

her granddaughter into the clinic, but after the doctor checked on the girl he became fascinated with the woman. He told us to take a good look at this woman as we may possibly never see this disease again. She had polio, and I will never forget what the disease had done to her leg. It had atrophied, the tendons had shortened, and she had a horrible limp because of it. Obviously, there was nothing that we could do for the woman, except look and burn the image of her leg into our minds. The doctor told us, "this is why you should vaccinate your kids." That was by far the most memorable thing I saw in consultation.

The education station was much more fun than the other two, because we were teaching and playing with children. Our brigade creates a charla ("chat" in Spanish) to present to the children. These entail reading children's books and creating fun little posters and activities, all of which are teaching the children about how to practice good personal hygiene and basic nutrition guidelines. The presentations would never last the full time that we were given (partly because the kids did not want to sit still any longer), so we wound up getting to play tag, soccer, frisbee, and bubbles with them! It was a blast.

I loved Honduras so much. It taught me so many things about the world and about myself as well. I learned that it is not necessary to have a ton of stuff, because the people in Honduras had significantly less than the average American, and by my observations, were just as happy if not more so. I got rid of my social media apps when I returned to the US. I realized that all they were mostly good for was wasting my time which I could spend actually living my own life. Probably the most wonderful thing that I learned about myself during this trip was the fact that I love to travel and experience new things. I had always longed to travel but until I actually bit the bullet and did it, I never realized how amazing it is. Since going to Honduras, I have traveled to five other countries and one new state. Travelling to Honduras inspired me to

learn Spanish as well as enter into the Global Health Track in medical school next fall. I hope to not only help the people in my community but also communities around the world. My Brigades trip to Honduras absolutely changed my life and I will forever be thankful for that experience.

Because I loved my Honduras brigade so much, I signed up without hesitation for another brigade to Pthat would take place from July to August of 2018. Everything was squared away, ready to go, when four days before the trip our coordinator at headquarters cancelled our brigade. We had been scheduled to go to Nicaragua, but in the months leading up to our brigade there was a lot of civil unrest involved with the country due to some corrupt government issues causing civilian uprisings. I understood why our trip was cancelled but I was still mad. However, our brigade was not completely cancelled. It was to be rescheduled for later in the summer to Panama, which was relieving. This actually worked out in my favor because it gave me an extra week to study for the MCAT.

My Panama brigade was not quite as spectacular as my Honduras brigade, but in other ways it was so much better. Our group size was much smaller, so I was able to learn everyone's name and get to know them, and we paired up with Western Kentucky University (WKU), so I was able to make new friends from another state. Since it was my second brigade, I took on more of a leadership role in certain things, such as creating the charla and working in triage. We had a lot of new people from both schools, so being one of the returners I was able to help keep things on track. The evenings in Panama were better than the evenings in Honduras because of the relationships I was able to build with everyone. All of us from OSU and WKU played games and ate dinner together, and just had a blast. Our translators even joined into the fun and played some games with us!

For this brigade, I moved between different stations but the main one I was in was triage. This was mostly because I could take vitals, which apparently a lot of people could not do very well. It was fine because I loved triage. In triage, I felt as though I was really being useful and helping out. I was also able to be in consultation some, which I greatly appreciated. The doctor I was in consultation with was from Columbia and spoke broken English. He was pretty great because he took the time to discuss with us what he was seeing in patients and how he was going to treat it.

On our last day, we went to a community where indigenous people lived. I was not aware of this, but the people from this village have lived in that area for hundreds of years or maybe more, since before Panama was even a country. I was pretty blown away at this fact. The only clothing they wear are brightly colored skirts handmade by and for the women, and the men wear shorts. They performed some of their tribal dances for us and showed us some of the beautiful art that they make (which was for sale).

While Panama did not have that "wow" factor that Honduras had for me (because you can only have that initial "wow" once), it was still an amazing trip, and it allowed me to conduct some research that I wanted to do. When thinking about what I wanted to do for my honor's thesis, I considered Global Medical Brigades (GMB) and knew that I wanted to do something with it. I had noticed while in Honduras that there was an excessive prevalence of overweight and obesity in the rural communities, so we decided to gather some data about the beverage consumption habits of the rural Panamanians. I decided on drinking habits because while in Honduras, I noticed how poor the water situation was, as well as how much soda the people were drinking. Therefore, I wanted to see if I could make a correlation between the drinking habits and the amount of obesity in these rural Central American countries.

III. Obesity in Panama in Comparison to the United States and Mexico

Because of the link between obesity and chronic diseases it is important to determine the prevalence and factors that contribute to the development of obesity in poor countries such as Panama. Obesity is a major risk factor for many of the chronic diseases, including cardiovascular disease, diabetes, depression, osteoporosis, and many others.

Only a few studies have been done investigating the obesity rates in Panama, but according to these studies overweight and obesity are certainly becoming an epidemic (Sasson). In 1982 the first nationally representative study was performed to assess obesity in Panama, and since that study there have been four others, with the latest occurring in 2010 (History). According to this study (Sasson), there has been a widespread increase in overweight and obesity cases in Panama, regardless of age, gender, or socioeconomic status. According to the study by Stoddard et al. (2011), being from a rural or indigenous community in Mexico is linked with lower rates of obesity, which is the opposite finding when compared to lower socioeconomic status citizens of developed nations (Stoddard). Stoddard et al. theorized that this is due to individuals from non-developed or developing nations being engaged in more physical activity on a day to day basis. The physical activity that they are involved in is generally work-related not leisure exercise. It is also thought that the differences in number of individuals that are overweight or obese could be due in part to the indigenous people not having the money or access to buy the calorie rich foods than those in more urban areas or with higher socioeconomic status have access to. When looking at indigenous Mexican families, it was found that the obesity rate was 21%, whereas the nonindigenous families were at 28% (Stoddard). The overweight category had similar numbers of individuals in the obese category with indigenous

families at 38% and families from nonindigenous places were 40% overweight. It was also found that the more indigenous peoples living in a community, the lower the rates of obesity were for that community (Stoddard).

The United States is the most obese country in the world followed by Mexico (OECD). Between fast food chains, capitalism driving down prices of food, and technology allowing us to skip out on the physical activity our predecessors had to do, our nation is becoming increasingly obese. According to the National Health and Nutrition Examination Survey, there is a significant difference in overweight and obesity rates when it comes to Americans living in rural areas versus those who live in urban areas (Befort). This study recognized that 39.6% of rural Americans were obese. For those that were not obese, 70.8% of those people were overweight. As for Americans living in urban areas, they had a lower obesity rate at 33.4% and 67.1% of nonobese individuals being overweight (Befort, C.A., et al. 2012).

It is clear that there is an obesity epidemic US, Panama and Mexico, however the distribution of obesity between them is opposite in nature. In Mexico and Panama, the greater rates of obesity tend to be more with people who have a higher socioeconomic status and living in an urban area. This is thought to be due to those people having more money to spend on calorie dense food and drinks as well as having different types of jobs and careers that do not require much physical activity. Being from an urban area contributes to this finding by presenting people with many more options for the calorie dense foods and drinks that they are consuming (Sasson).

In the US, being obese is associated more with having a lower socioeconomic status and being from a rural area (Befort). The factors, however, are somewhat the same as they are for the people in Panama and Mexico. Having a low socioeconomic status in the US is associated

with obesity because it is much cheaper (and more available) for families to go buy junk food or fast food than it is for them to buy nutrient dense fruits, vegetables, and other foods that are not extremely high in saturated fats and cholesterol. As is well known, eating fast food and junk food which are both extremely calorie dense on a regular basis is associated with high risks for obesity. Being from a rural area in the US only exacerbates the issue, because unlike urban areas it is much more difficult to find good sources of healthy foods that are of good quality. This is why being from urban Mexico and Panama, and rural US is associated with overweight and obesity.

VI. Environmental Causes of Obesity

Despite rural Panama being a relatively poor area in comparison to its bigger cities and other developed nations, one thing it is not poor in is food. However, the types of foods and drinks they are consuming are not always the most nutritious. Rapid urbanization is much to blame for why obesity rates are higher in urban Panama versus rural Panama. In urban Panama, traditional diets are those that can easily lead to obesity. The diets are generally high in carbohydrates and fats but also decent amounts of vegetables. Rice and tortillas are two extremely common staples of the region, usually eaten at almost every meal. Due to the urbanization, however, those living in those areas now have access to new foods that may not be traditional to the region (i.e. foods from a Western Diet). These, among other food habits, such as consuming more soft drinks, are just one of several reasons why there an upward trend in obesity. One reason why rural Panamanians are collectively less obese than their urban counterparts is because they are eating more traditional foods, which tend to be more nutrient dense (Stoddard et al.).

The activity level between urban and rural Panamanians is another major factor contributing to the difference in obesity rates. Those who live in urban areas have careers and jobs that require much less physical activity, such as health professionals, store clerks, business people, and others. They also have amenities that allow them to be less physically active, such as vehicles, stores that are close by, public transportation, and others. When compared to their rural counterparts it is easy to see why level of physical activity plays a significant role in the rate of obesity. Farming is probably one of the most common jobs in rural Panama and it is not like the farming in the United States. Farmers in rural Panama work the large fields by hand, using hoes or horse drawn plows to plow the dirt, machetes to cut the grass, and their hands to gather the crops. It is very physically demanding, and it is a job they do every day.

The level of physical activity in urban Panama is about the same level of physical activity in both rural and urban United States (Befort and Sasson). Even in poorer areas in the US, there are amenities available to us that allow us to not be physically active. This is another contributing factor into why rural Americans are more obese than their urban counterparts. They are working jobs that might require some physical activity but not enough to balance their energy intake. Their urban counterparts, despite having even less physically demanding jobs, generally have more time and money to afford things like gym memberships and healthy, nutrient dense foods.

VII. Methods

Before my departure for the Global Medical Brigade, approval to collect the data from the Oklahoma State University Institutional Review Board was obtained. All data was obtained when participants visited the Global Brigade medical clinic in the rural Panamanian

communities. Before any data were recorded, verbal consent was obtained for each participant. When the participants came into the triage station to have their vital signs taken, I asked, with the help of translators, how many cups of milk, soda, and water they drink each day. In order to ensure consistency in results, I showed each participant the exact same cup for a reference in what size of drink I was referring to when I asked how many "cups". As they answered the questions, their responses were recorded. For each participant I also collected their height, weight, age, and sex from their patient charts they obtained from the medical clinic.

Table 1. Characteristics of Local Panamanians that Participated in Medical Brigades Clinic

	Male (n=9)	Female (n=21)	Overall (n=30)
Height (cm)	152.7±14.3	151.3±8.2	151.7±10.2
Weight (kg)	57.5±15.5	59.8 ±8.6	59.1±10.8
BMI (kg/m^2)	24.1±3.6	26.2±3.9	25.6±3.8
Age (years)	43.7±25.1	38.0±17.7	39.8±20.4

Table 2. Beverage Consumption of Local Panamanians that Participated in Medical Brigades Clinic

	Male (n=9)	Female (n=21)	Overall (n=30)
Water (cups/day)	3.4±1.1 ± SD	4.9±2.7	4.4±2.4
Milk (cups/day)	0.8±.7	0.9 ±1.0	0.8±.9
Soda (cups/day)	1.9±1.3	1.5±1.7	1.6±1.5

VIII. Drinking Habits of Rural Panamanians

While in Panama (and the year prior in Honduras, which is what sparked the interest of this study), I was able to casually observe the beverage consumption habits of the citizens who attended our medical clinic. Just based upon my eyewitness account, I could tell that the rate of soft drink consumption was about the same as, or maybe slightly higher than that in the United States. What I noticed more were that those looking around the teenage years or younger drank more soft drinks that anyone else. I must state that pure visual observation with no records collected cannot be a completely valid source of information; however, I felt it necessary to include due to the number of soft drink consumers I noticed. I did, however, collect real data to accompany my casual observations of the beverage consumption habits of Panamanian. What I saw with the results of my data were a little surprising to me, in the fact that not as much soda was consumed as I had anticipated. Out of all the people on which I gathered information, the average consumption of soft drinks was a little under two cups per day.

Another point of discussion worth noting is the level of physical activity that I personally noticed. Based upon my observation of the people in that area, school age children were getting an adequate amount of exercise from being in school, the men seemed to get some exercise with the type of labor that they did, but the women did not seem to engage in very much exercise compared to the other groups. However, I cannot confirm this observation since I did not collect data on exercise habits of the participants.

The chronic disease prevalence in Panama is similar to that in the U.S (Sasson). Based upon my observations, both visual and research, it is plausible that there is a connection between the beverage consumption habits and exercise habits of rural Panamanians and the rate of obesity

that is present in such areas. As previously discussed, the rates of obesity in these rural areas are slightly less prevalent than more urban areas due to the type of work and amount of spending money, but there still appears to be a correlation. More targeted research will need to be conducted on this matter to determine whether or not a significant correlation exists.

IX. Implications

Through the research conducted I have found that some people in rural Panama drink in the range of slightly under two cups of soft drinks per day, about four cups of water, and about one cup of milk each day. At this point I would encourage all the people to better their water and milk consumption, while decreasing soft drink consumption. There needs to be more studies conducted before definitive, specific recommendations can be made. Because people in urban areas tend to have higher socioeconomic statuses, they tend to have higher soft drink consumptions (Sasson). This means that while those in urban Panama consume more high energy drinks than those in rural Panama, the rural Panamanians still need to lower their overall soft drink consumption. Based on this evidence, there is cause for further research and eventual diet intervention in the area where I conducted my study, and other like areas. Due to the rates of obesity in the country of Panama, looking at beverage consumption habits alone can be a great start at one day lowering not only the rates in the rural communities like what I visited, but also the entire national Panamanian average.

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APPENDIX A

Data for Each Study Participant

Patient #	Gender	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m^2)	Water Intake (cups/day)	Milk Intake (cups/day)	Soda Intake (cups/day)
1	M	72	168	82.7	29.3	4	0	3
2	M	38	166	65.4	23.7	5	2	1
3	M	39	157	60	24.4	5	0	0
4	M	7	120	24.5	17	3	1	2
5	M	82	156	64	26.3	4	1	2
6	M	75	147	57.3	26.5	2	0	1
7	M	17	155	50	20.8	2	1	1
8	M	28	159	60	23.7	3	1	3
9	M	36	146	54	25.4	3	1	4
10	F	46	163	72.7	27.3	13	1	0
11	F	59	145	47.7	22.7	5	2	3
12	F	17	153	72.7	31.1	5	0	5
13	F	22	148	55.5	25.3	5	3	4
14	F	17	157	50.5	20.5	4	1	3
15	F	41	164	61.8	23	4	0	0
16	F	19	138	61.7	32.5	5	0	2
17	F	25	146	61	28.6	4	2	4
18	F	45	161	75	29	10	1	0
19	F	31	153	54.5	23.3	1	1	3
20	F	24	150	60	26.7	5	0	1
21	F	44	149	63.6	28.6	5	1	1
22	F	53	152	59.1	25.6	4	3	0
23	F	71	148	50.9	23.2	1	0	0
24	F	32	168	49.7	17.6	4	1	0
25	F	25	150	51	22.7	4	1	0
26	F	73	139	56.4	29.2	3	0	0
27	F	68	149	70	31.5	4	0	1
28	F	18	148	53.6	24.5	3	1	1
29	F	37	158	72.7	29.1	8	0	0
30	F	32	139	55	28.5	5	0	3

APPENDIX B

Pictures of my Experience with Global Medical Brigade in Panama

In Oklahoma City airport on our way to Panama!

In Panama, and everyone has crashed…

We made it to our compound. This will be our room for the next week.

Here we all are getting our medications situated.

This is our entire GMB group at the compound as we headed off to our last clinic day.

On our way to the clinic site. We had some pretty nice buses!

One of my favorite things: Playing keep away from the kids!

In triage taking a mother's pulse.

Taking a girl's blood pressure in triage one day!

This little boy wanted to sit in my lap, so I had to get a picture with everyone.

Some of native Panamanian tribeswomen that were selling the very interesting handmade crafts