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Developing a Community Health Worker Program in Chichigalpa, Nicaragua

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ABSTRACT

The city of Chichigalpa, Nicaragua suffers from poor health that causes high rates of morbidity and mortality. Consequently, the people in Chichigalpa could be helped with better water solutions, nutritional status, and overall health knowledge. The people are poor and often do not have access to a doctor due to location or financial reasons. Therefore, a Community Health Program was created to train local community health workers to screen for diseases and to teach the local people preventive care, mainly focusing on water, nutrition, and CKDu. Objectives included assessing the community, recruiting community health workers, developing training curriculum, and training the community health workers. By creating local health workers that can go out into the community, the people can gain better health knowledge and skills to live healthier and longer.

INTRODUCTION

With a population of 5.8 million people, Nicaragua is the largest country in Central America.[1] Despite its size, the country suffers from poor health that causes high rates of morbidity and mortality, particularly in the rural communities. This tragedy is particularly true in Chichigalpa, a city located in the Chinandega Department in the northwestern region of Nicaragua. Chichigalpa is comprised of several surrounding rural communities, tallying 50,000 people in total.[2] Many of these people live in poverty, without the funds for proper health care and with little help from the uneven distribution of health services from Nicaragua's unstable government.[1]

Insufficient clean water sources, poor nutrition, and an overall lack of basic health knowledge largely cause the poor health status of this community. Water is essential to life, and access to clean water has been recognized as a basic human right.[3] However, in Nicaragua, there are still rural communities that lack access to improved water sources.[4] Additionally, the people have a very poor nutritional status that increases their high rates of morbidity and mortality.[5] Two of the great health problems brought upon largely by poor nutrition are high blood pressure and diabetes.[5] Unbalanced diets from a lack of nutritional knowledge, inadequate food intake from living in poverty, and the poor cooking habits of the culture all contribute to a nutritional deficiency exacerbating current illnesses.

Furthermore, the people in Chichigalpa lack basic health knowledge for how to prevent and treat diseases. Currently, the leading cause of death in men in Chichigalpa is chronic kidney disease of unknown etiology (CKDu).[6] This disease has a very high prevalence in younger men working in the agricultural industry, particularly sugar plantations.[7,8] The city of Chichigalpa houses one of the largest sugar cane factories in Central America, which many researchers believe to be a leading risk factor for CKDu, as many of the men with the disease work at the sugar cane company.[9] In addition to agricultural field labor, studies have shown that alcohol consumption and water intake are associated with renal insufficiency disease in this region.[10] Ongoing research is seeking to determine the exact cause of this epidemic, but researchers do know that healthy lifestyle choices, such as decisions about what a person eats and drinks, can help treat the disease and decrease its progression.[11]

The rates of morbidity and mortality from lifestyle diseases have been increasing in Chichigalpa, Nicaragua throughout the past century.[1] Consequently, the people in Chichigalpa

could be helped with better water solutions, nutritional status, and overall health knowledge. Therefore, a community health program was created to train local community health workers to screen for diseases and to teach the local people preventive care, mainly focusing on water, nutrition, and CKDu.

Objectives were developed to create and implement this program to accomplish the goal of bringing better health to the population of Chichigalpa. The first objective was to assess the community. This was necessary to determine what the greatest health problems are and which health problems are most changeable. The second objective was to recruit community health workers. These were local people that could influence the community towards better health. The third objective was to develop a curriculum to train the local health workers. This curriculum was focused on the specific needs of the community based upon the results of the community assessment. The final objective was to implement the curriculum and train the local people that were recruited to be community health workers.

METHODS

Assessing the Community

In order to bring better health to the population, an assessment of the population's current health status, beliefs, practices and needs was required. A participatory appraisal was chosen as the health education model for the assessment of this project. Participatory appraisals, also called rural appraisals or participatory research and action, are effective at gathering a significant amount of information in a small amount of time. Participatory appraisals have been recognized as a "powerful means of not only involving community in identification and analysis of problems, but also in planning and implementation of programs."[15] They assess a community by integrating the thoughts of local people into the actual planning and development of community programs.[16] Community participation was key to recognizing the perceived needs.

A participatory appraisal was conducted of the community through interviews and observations. The audience for the participatory appraisal was the community, who actively identified their own problems and determined the greatest health needs. The information from the participatory appraisal provided insight on life in the community, as well as the needs of the community. This information was then used to plan out the rest of the program and health trainings. Specifically, information was gathered from the community regarding family structure

and size, typical diets, foods available, health-related beliefs, health-related practices, common diseases, environmental challenges, and what the people thought the greatest health problems in their area are. Originally, door-to-door surveys were chosen as the best method to assess the community. However, a good survey assessment was not a viable option due to a lack of time, a lack of personnel, and the rainy season in Nicaragua that made frequent daily walks to houses very difficult. Instead, the information was collected through several methods.

Semi-structured Interviews. Much information was gained through informal interviews with various community members of differing backgrounds. Key community informants were identified and interviewed. Information regarding the greatest causes of injury and disease in patients was collected from talking with four doctors, three nurses, and a pharmacist working in the area. An adaption of the Delphi method was used with the medical personnel to determine the greatest health problems in Chichigalpa. The Delphi method is a structured process typically used to developed health quality indicators.[17] For this assessment, doctors were asked to rank the greatest health problems. After the initial rankings from each doctor, the doctors together came up with a list in order of the greatest health problems (See Table 1).

Six local pastors were also asked questions regarding the social structure and health issues in the community. A scientist who has been studying the water issues and CKDu in the area for the past five years was also consulted. Additionally, local employees who work at the mission that started the community clinic provided input regarding the perceived needs of the area. All these people were key informants that provided insight regarding the needs of the community. The researcher spoke with all these people in a quiet and comfortable place where questions could be answered through free-flowing conversations. The answers and information given was recorded during the conversation or immediately after. Although this initial information obtained was not from the total population, key informants still show the apparent needs of the community and can provide a good health assessment of the community.[18]

Direct Observation. Home visits were a quick and cheap method of data collection with a limited amount of time and no funding for any other testing or research assessment. There was a local woman who is well known in the community and was willing to go from house to house with the American researcher to gather data and make the local people feel confortable to answer the questions. Information was gathered from twenty- two houses regarding the living conditions, health habits of the family, and perceived health needs of the community. During the

first month of living in the community, the researcher was able to directly observe environmental factors—such as the rainy season and high temperatures—that influence the community's health, as well as cultural and social norms.

Focus Groups. Information from three different focus groups was also used as a participatory appraisal technique for the community assessment. The focus groups consisted of the community health workers and were broken up into three different locations representing various "barrios" (towns or neighborhoods) in Chichigalpa. A group was asked to list what they thought the different health problems were in their community. The group then ranked on a scale of one to five, with five being the most, how common they thought the health issue was. The group repeated that process again by ranking how serious the health issues was. These two numbers were added together to determine the overall importance of the health issue to the community. Each of the three community groups performed this process to provide three different data sets in the different parts of Chichigalpa (see Figures 1-3).

Data Analysis. After having all of the data from the assessment of the community, the greatest health needs of the population were prioritized to develop a training curriculum. The data analysis included information from the medical personnel and local people that were interviewed, as well as observations from the home visits. Not only were the greatest health needs examined, but also what issues are most easily changeable with the available resources to have the greatest impact. This information was analyzed and synthesized so that a curriculum could be developed to train community health workers to address the greatest health needs of the community.

All groups questioned included four particular health problems in their rankings—diabetes, CKDu, high blood pressure, and respiratory infections. Therefore, a statistical analysis was performed to compare the rankings of diseases between the expert opinion of the medical group (the doctors interviewed) and the lay people (the three community groups). The community results were combined into one group to be evaluated against the medical group. A chi-square test using excel was applied to compare the mean rankings of the medical group for each disease with the mean rankings of the combined community groups in order to determine any significant difference in the rankings between the two groups. See Table 2 for the results of the statistical analysis.

Community Health Workers

Recruitment. This program's focus was designed to utilize community health workers. Community health workers have shown to be cost efficient, sustainable, and effective for improving health outcomes.[12] First, these local workers needed to be recruited. Local pastors at the mission's different outreach churches assisted greatly in the recruiting process. A meeting with the pastors gave them information on what qualities to look for in a community health worker. Afterwards, the pastors each recommended one to three community health workers. Information about this program and the opportunity to be a health worker was also spread through personally speaking with other recommendations, over the radio, on a television show, and by word of mouth. A meeting was then held with these potential candidates to further explain their role and the necessary commitment. The community health workers were not paid, but were told of the benefits to the community and of some personal incentives to become a community health worker.

Curriculum Development. The curriculum for training the community health workers was developed based off the community assessment. The training curriculum included five lessons and addressed the health needs related to the underlying causes of the greatest health problems. The focus of the training material was on teaching the community health workers 1) how to screen for diseases and when to refer a sick person to the doctor; and 2) how to teach local people preventative care. Each lesson contained various components of learning outcomes and professional competencies, standardized criteria for success, learning resources and activities, and learning evaluation.

For example, one lesson included teaching on blood pressure. The competencies encompassed the ability to take blood pressure. The standards that needed to be met were the ability to properly fasten blood pressure cuff, inflate the cuff, use the stethoscope, and listen and record the pulse. Learning activities involved going over a handout on how to take blood pressure, observing blood pressure being taken, and practicing taking blood pressure on each other. The learning evaluation was the instructor observing each student taking another person's blood pressure and making sure all standard criteria could be performed correctly. See Table 5 to view the module on measuring blood pressure, which was a part of the first of the five weekly lessons.

In order to make the program sustainable, continued monthly community health worker meetings were planned. A schedule was created with curriculum for the clinic's doctor to teach for further training during the monthly meetings. The content was made to center on further health needs of the community that were identified during the community assessment. The schedule was set in place for the next six months with the help of the doctor and the clinic manager.

Training. After the assessments, analysis, recruiting, and curriculum development processes were completed, the community health workers began training. Due to the large volume of health workers, the great needs in rural areas and scheduling constraints, the people were split up into three different groups based on their geographic location. Three different training sessions were held each week, all covering the same material that focused on issues relating to basic care, nutrition, water, and disease prevention and management. There were five different lessons once a week, each lasting two hours, for five weeks. To become certified, a health worker was required to attend the lesson at his location each week for the five weeks of training.

Each class involved a lecture portion and a practical hands-on time, such as using the available equipment like blood pressure cuffs. At the beginning of every class, the health workers were given handouts with information to write on and to take home to review. At the end of class, students were given some sort of evaluation as well as homework to turn in next class. The health trainer utilized tests and role-playing as a practical approach to evaluate what the health workers learned at the end of the training.

RESULTS

The objectives of the project were evaluated to decide whether or not the program was successfully carried out as planned.

Objective 1

After receiving all of the information from the participatory appraisal, the results were analyzed to determine the greatest health needs of the community. This information was obtained through semi-structured interviews with key informants in the community, home visits from twenty-two houses, and three focus groups.

Results from the individual interviews were in agreement. The medical personnel interviewed established the following list as the greatest health problems in their community: diabetes, CKDu, kidney disease/urinary infections, high blood pressure, infections in the body (specifically in the feet, legs, throat and arms), respiratory infections (including pneumonia and asthma), stomach pain, diarrhea, parasites, arthritis, anemia, heart attack, malaria and dengue, meningitis. The doctors ranked what they believed to be the five greatest health issues in the community, as illustrated in Table 1.

Table 1. Doctor's Ranking of Most Common Health Problems in the Communities

Greatest Health Problems According to Doctors
1. Diabetes
2. Kidney Disease*
3. High Blood Pressure
4. Infections (including respiratory infections)
5. Digestive Problems (including parasites and diarrhea)

* This includes both kidney disease and chronic kidney disease of unknown etiology (CKDu). The doctors distinguished between the two diseases, but could not say which health problem was more common because the order varied depending on the location. In general, Kidney Disease is greater than CKDu; however, in certain locations in Chichigalpa (such as La Isla) doctors would rank CKDu as greater than Kidney Disease. The doctors tied regular kidney disease and CKDu and grouped them together as kidney disease.

Information obtained from the people through home visits and key interviews provided similar information. People in the community believed the greatest health problems to be high blood pressure, CKDu, diabetes, and respiratory infections in children. Diarrhea, stomach pain, foot infections, high-risk pregnancies, and malaria during the rainy season were also stated to be problems in the community. Out of the 22 homes that were visited, 4 older people had arthritis, which is an additional burden of disease in the community.

Observations from home visits showed that too many people, 6-10 people on average, live in one small house, often with extended family living together. Houses use chlorine-treated

city water through a piped system; however, this water is sometimes turned off at random times during the day or when it rains. People do have access to pit latrines, although not all latrines have cement. Out of the houses visited, 50% of the homes have some type of fruit or vegetable growing in their yard.

The results from the community health worker focus groups varied between the different locations. Figures 1-3 illustrate the relationship between the different health problems according to each group of community health workers. The graph also depicts the relationship between how common the issue is in the community verses how serious this issue is. Those numbers were added together to determine the overall importance of the health issue to the community.

Figure 1. Health Problems in Santa Matilda According to Community Workers

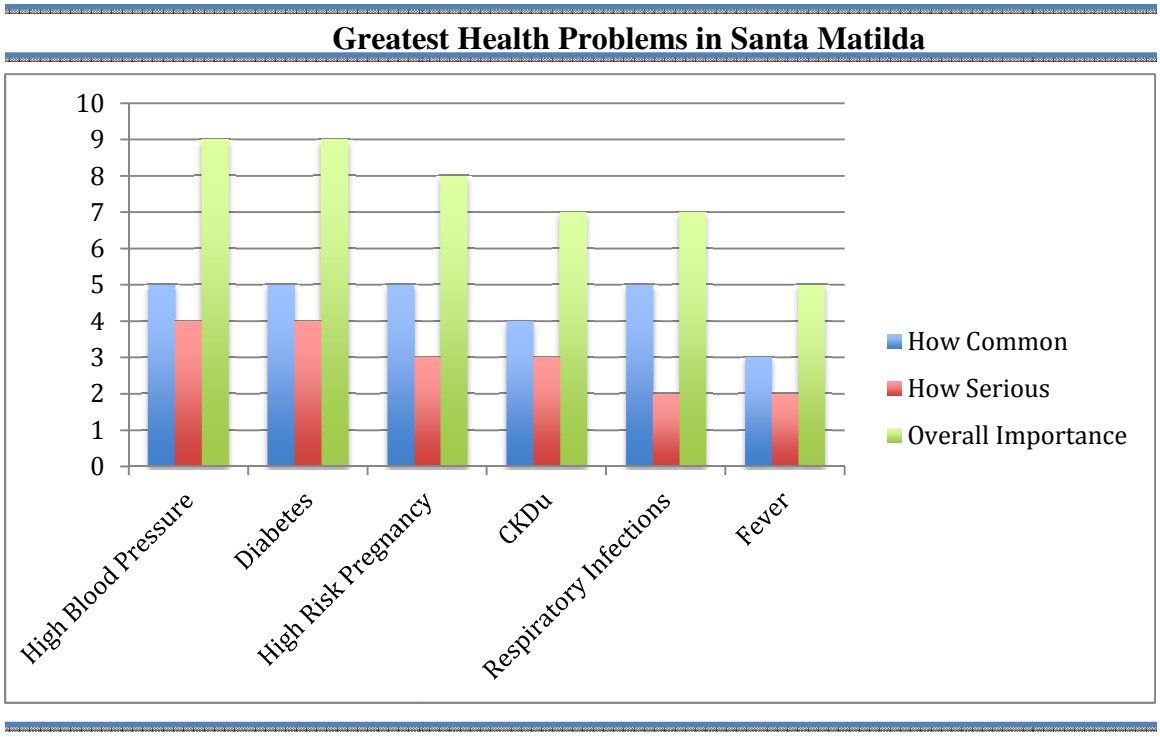
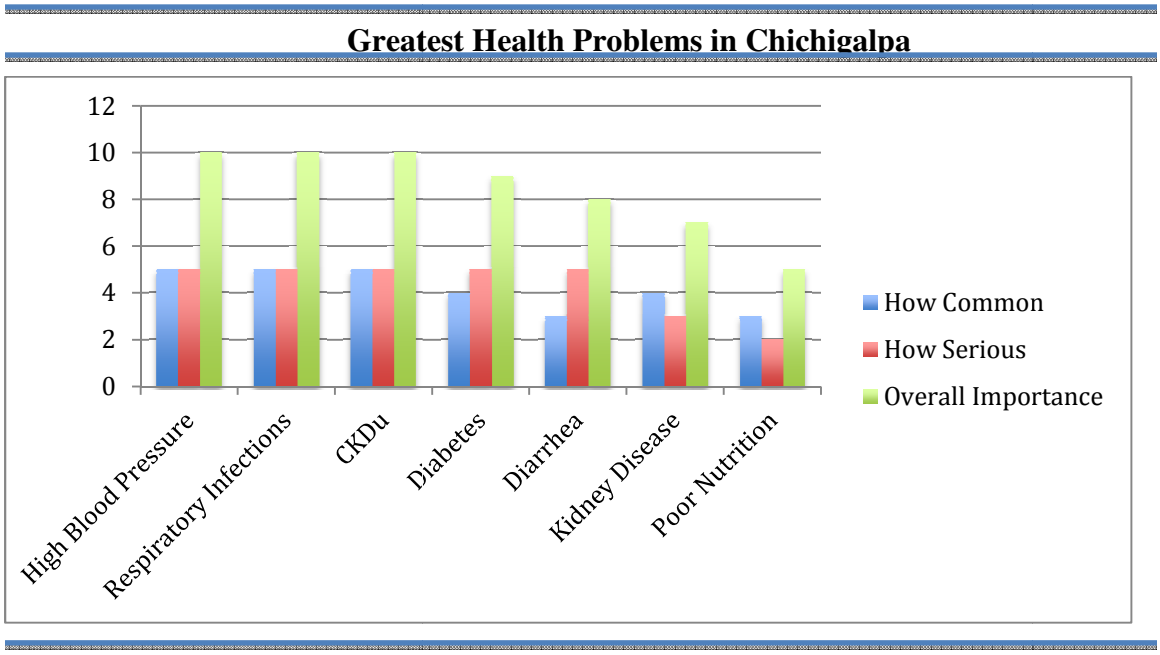
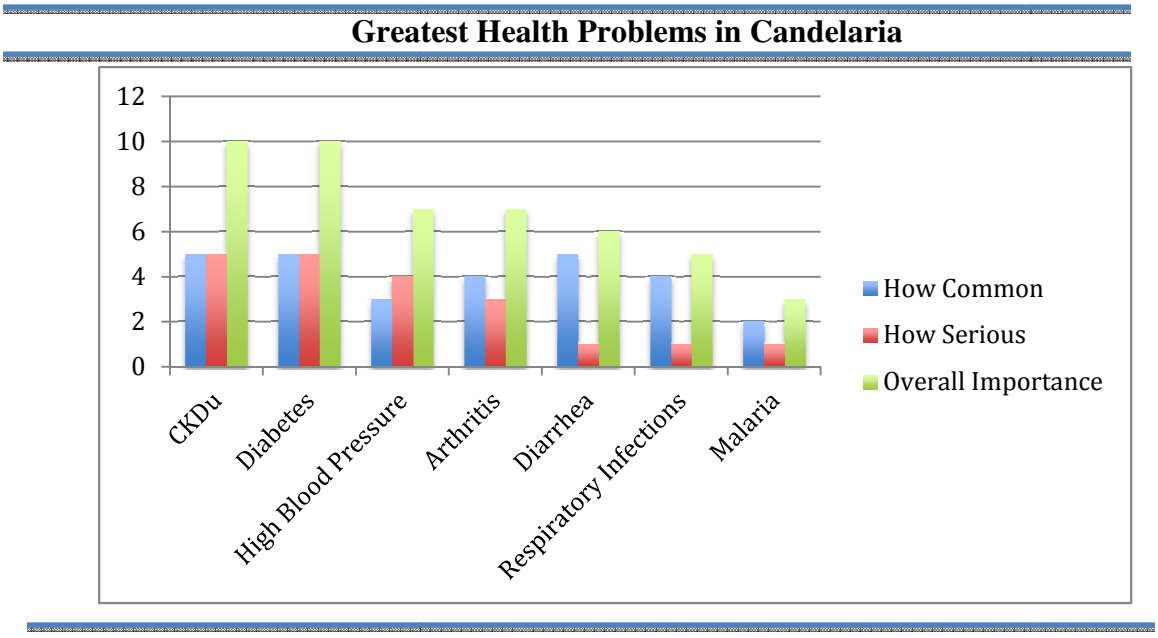


Figure 2. Health Problems in Chichigalpa According to Community Workers



*The community groups differentiated between chronic kidney disease of unknown etiology (CKDu) and kidney disease related to obesity, hypertension, and diabetes.

Figure 3. Health Problems in Candelaria According to Community Workers



All three community groups identified four health problems in common—diabetes, CKDu, high blood pressure, and respiratory infections. The medical personnel also identified these four health problems. A chi-square test, performed using an excel document, combined the three group rankings in Figures 1-3 and compared those means to the doctor's rankings. The data from the community groups was the observed data, and the data from the doctors provided the expected data.

Table 2. Chi-Square Test Comparing the Health Problem Rankings According to the Medical Group and the Community.

Chi-Square Test of Health Problem Rankings

	Observed (Community)	Expected (Doctors)	(O-E)^2/E
Diabetes	9.3	10	0.049
CKDu	9	9	0
High Blood Pressure	8.7	7	0.412857143
Respiratory Infections	7.3	5	1.058
Total			1.519857143

Test statistic	1.519857143	= sum of (O-E)^2/E for all cells
df	3	df = number of categories - 1
p-value	0.677694954	= CHIDIST (test statistic, df)

The resulting p-value was 0.678. The null hypothesis stated that there is no significant difference between the expected and observed result. [19] Since the p-value was greater than .05, the null hypothesis was not rejected. Therefore, the results concluded that there was not a statistically significant difference between the rankings of the medical opinion and the local opinion—both groups agree on the greatest health problems in the community.

Objective 2

The second objective was to recruit 5-10 local people in the community to be community health workers. This objective was not only met, but was exceeded. After the initial interest meeting, 25 local people signed up to be health workers. The public health trainer expanded the program into three community health groups and divided the community health workers into three groups based on geographic location. Many of the health workers live in different locations throughout Chichigalpa, with more people signed up from sections with larger populations. The first week of trainings included 34 people. Table 3 shows the locations of the community health workers and the division of the three group trainings. Nineteen locations are represented.

Table 3. Location of Community Health Workers by Training Groups

Community Health Workers by Location		
SANTA MATILDA	**CHICHIGALPA**	**CANDELARIA**
Santa Matilda	Santiago	Nuevo Amanecer
Santa Matilda	Santiago	Nuevo Amanecer
	Santiago	Nuevo Amanecer
	Santiago	Nuevo Amanecer
	San Antonio	Marvin Salazar III
	San Antonio	Marvin Salazar III
	San Antonio	Guanacastal
	Quetzalia	Guanacastal
	Quetzalia	La Isla
	La Quintanca	Candelaria II
	La Quintanca	Candelaria II
		Candelaria I
		Candelaria I
		Colonio Gimenes
		Modesto Palma
		Erick Ramírez
		Iglesia el Pueblito
		Las Palmeras
		Cuitanca Sur
		Juan José Briceño
		La Cruz

Objective 3

The third objective to develop a training curriculum was completed. The public health instructor developed the training curriculum based off the results of the community assessment. Information from the doctors and focus groups indicated the greatest health issues in the community to be diabetes, CKDu, high blood pressure, and respiratory infections. These problems can be largely helped if not completely prevented by lifestyle changes. Therefore, a list was compiled of subjects to teach that would address how to prevent the health problem and/or how to treat it. The different learning modules were separated into five lessons for each week based on the similarities of the topics. Table 4 provides the lesson subject for each week of training that was completed, as well as the dates of the trainings.

Table 4. Training Curriculum Schedule

Lesson	Date*				
	26-Jul	2-Aug	9-Aug	16-Aug	23-Aug
Basic First Aid and Taking Vitals	X				
High Blood Pressure, Diabetes, & Nutrition		X			
Water Issues and CKDu Management			X		
Sanitation and Preventing Infections				X	
Baby Care and Child Respiratory Problems					X

*The dates are the Saturday of the week of training, although each week had three trainings on different days for the different group locations.

A further sub-objective of the curriculum development was to create a training curriculum schedule for future trainings for the next six months. A doctor and a nurse will be working together to provide future monthly trainings for the community health workers. All six training sessions were planned based off the additional health concerns of the people and the medical personnel from the participatory appraisal. Table 5 shows the additional training schedule for the next 6 months.

Table 5. Future Training Curriculum Schedule

Lesson	Date					
	5-Oct	**2-Nov**	**4-Dec**	**4-Jan**	**1-Feb**	**1-Mar**
Arthritis & How to Make a Hot Compress	X					
Malaria and Dengue Prevention		X				
Family Planning and Sexually Transmitted Diseases			X			
Skin Infections				X		
How to Take Blood Glucose					X	
Kidney Stones & Other Gut Issues						X

Objective 4

The final objective was to train the local health workers. Throughout the course of five weeks, the health trainer conducted five different health lessons—one per week. Because there were three different groups of community health workers out of necessity, the lessons were repeated in the different locations three times each week. The same lesson was taught to each individual group every week. Depending on the lesson's learning outcomes, different forms of evaluation were used to determine if the objective was truly met and the health workers could understand and could use the information from the trainings. Table 6 shows an example of a module learning plan that was taught to the health workers.

Table 6. Module Learning Plan for Blood Pressure.

Component—Blood Pressure
Learning outcomes and professional competencies
1. Take Blood Pressure 2. Interpret Results 3. Advise a person with High Blood Pressure
Learning resources and readings
1. Handout 2. Blood pressure cuff 3. Stethoscope 4. White board
Standardized criteria for success
1. Can properly fasten blood pressure cuff; inflate cuff; use stethoscope; listen and record the pulse 2. Can accurately interpret the result and differentiate between normal, normal high, and high blood pressure 3. Can provide 3 things a person can do to lower high blood pressure.
Learning activities
1. Listen to lecture on blood pressure 2. Observe blood pressure being taken 3. Practice taking blood pressure
Learning evaluation
1. Instructor observes each student taking another person's blood pressure and makes sure all criteria can be performed correctly. 2. Students role-play advising a person with high blood pressure and instructor observes to ensure criteria is met.

For the module of taking blood pressure, one hundred percent of the students were able to pass the learning evaluation. After the initial evaluation of blood pressure, eight of the students struggled to properly take blood pressure. These students remained after class for additional practice and were able to successful take and interpret blood pressure, as well as explain things a person can do to lower blood pressure to the instructor. In total, 34 health workers completed training and will receive certification as a community health worker at a future graduation ceremony.

DISCUSSION

At the beginning of the program planning stages, surveys were originally chosen as the best method of data collection. However, a participatory appraisal was done instead that used observations, interviews, and focus groups. This method was effective at assessing the community, as it focused on and involved the community members themselves. Research that involves the community can help to facilitate cooperation and promote reciprocal knowledge.[13] Furthermore, participatory appraisals have been shown to increase the sustainability of a project goal when performed properly.[15]

Although the community groups each named their own health problems, all three of the community health groups named high blood pressure, diabetes, CKDu, and respiratory infections as the health issues of overall importance in their communities. In addition, those four health problems were ranked as leading causes according to the medical personnel. There was a statistically significant consensus between the medical personnel and the lay people in the communities about what the greatest health problems are in the community (see Table 2). The statistical analysis was done with a small sample size, so the interpretation yielded from chi-square test should note that the results could be inaccurate. Available national data of the burdens of disease in Nicaragua stated diabetes, high blood pressure, and kidney disease to be the top health issues.[5] These statistics agreed with the data obtained from the participatory appraisal—both from the medical personnel and the local people. This showed that the people's perceived health needs in relation to causes of death from disease matched the actual needs. Consequently, the training curriculum was formed to target those issues. Interestingly, those problems, excluding CKDu, are typically caused by behaviors that can be changed; they are preventable.

Another adaptation had to be made early on in the program. The original plan included training only one group of five to ten community health workers. However, due to the large amount of interest, there needed to be more than one training each week. Additionally, some of the community health workers lived in rural locations, further away from the central training location. Consequently, the health workers needed to be divided into different groups in their geographic locations. Although, the program was initially only targeting one barrio in Chichigalpa, multiple barrios and a large portion of the population on Chichigalpa is now represented in the program. In fact, all the health workers make up nineteen different barrios (see Table 3). This change will allow for more people in Chichigalpa to be reached.

Recruiting good health workers was an important part to the success of this program. By using local people, such as the pastors, to recommend good health workers, the training instructor was able to find reliable and interested people. Still having 34 committed health workers after four weeks of training evidenced this success. Also, by advertising for the program through the radio and television, many people heard about the new health program. This will help the community health workers to assimilate their information into the community in the future, since many people now know about the health worker trainings.

Recommendations

This program does not end with the trainings. After completing training, there will be a big graduation ceremony for the health workers, where each person will be given a certificate and an ID badge saying the person is now a Certified Community Health Worker. The event will be for the whole community, and the health workers will be able to invite their friends and families. The graduation ceremony will give the community health workers prominence in the community and will allow local people to know who the local health workers are. Additionally, each community health worker will receive his own blood pressure cuff and stethoscope, a thermometer, and a voucher for a free doctor visit at the mission's clinic each month. These items were given as donations to this health outreach program from World Medical Missions.

Previous interventions have shown the necessity of providing good support during and after community health worker training.[13] Continued support will be vital to the success and sustainability of the community health workers. Having a sustainable program will allow for continuous access to accurate health information and proper referrals to the clinic. Therefore, community health workers will have mandatory monthly meetings run by the clinic staff that will continue after becoming certified as a community health worker. These meetings will be very important to the sustained success of the program, as they are a time of support, encouragement, accountability, and further training.

During one of these monthly meetings, the doctor will teach the health workers how to take blood glucose. Two blood glucose meters and 500 test trips were also donated to the program from World Medical Missions and can be shared amongst the community health workers. For future support of the program, more test strips will need to be donated. Further options include getting donated medicine kits with basic gauze and Band-Aid supplies for each community health workers.

Conclusion

Public health seeks to find the root problems, to prevent diseases, and to equip people for behavior change. The goal of this program sought to improve those areas of public health in Chichigalpa, specifically for the people who previously lacked health knowledge or access to health services. To date, this community health program has been a successful project. Each of the four objectives was met. Furthermore, there is an opportunity for this program to continue to expand, as more information will be learned every month at the additional trainings. By utilizing local people as health workers, much information can be disseminated out into the community and can be more easily accepted than by just having a health seminar by an American. The diseases that plague Chichigalpa are largely related to lifestyle choices—eating to much sugar, drinking sodas and not enough water, cooking with a lot of oil, and not getting enough exercise. The first step towards changing these problems and creating better health for the people in Chichigalpa involves equipping the population with the proper knowledge. By training community health workers to train other people in the community, many people are able to learn how to live healthier.

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