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**Assessment of the reliability of the diagnosis of Chagas Disease by indigenous
promotores of the Amazon Basin in Ecuador**

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ABSTRACT:

Chagas disease, caused by the protozoan parasite, *Trypanosoma cruzi*, is the most important vector-borne disease in Latin America. It is estimated that 16 to 18 million people are infected with Chagas disease and some 50,000 people die each year. In endemic countries, people living in rural areas are at greatest risk for acquiring infection. Ecuador is one of these countries, and it is estimated that between 2.4-3.8 million people in Ecuador are exposed to Chagas disease, primarily in the Eastern endemic coastal region. The indigenous people of the Amazon region in Ecuador have historically been protected from Chagas disease due to a geographic border provided by the Andes Mountain Range. However, recent developments in oil mining in the Amazon Basin have created a need for migratory workers resulting in a population shift from the Chagas endemic coastal region into the Amazon Basin. This migratory shift can have an ecological as well as epidemiological impact on the indigenous population by the introduction of a disease that is largely unknown, opening new possibilities for expanding the domestic cycle of Chagas disease. This research study is an assessment of the reliability of the recognition and diagnosis of Chagas Disease by indigenous promotores of the Amazon Basin in Ecuador. Survey questionnaires were conducted in face-to-face-interviews with indigenous promotores who lived and worked in the communities along the Napo River of the Orellana province in Northeastern Ecuador Amazonia. The questionnaire is composed of simple yes/no, multiple choice, and open-ended questions designed to assess the knowledge of acute and chronic stages of Chagas disease, signs and symptoms, and knowledge of Chagas transmission vectors. The survey included 18 of the 22 communities present, covering 81.8% of the entire available communities. Of these communities, 15 were included in the survey, and 3 were excluded. A total of 19 interview-surveys were conducted. 42% (8 out of 19) of the promotores surveyed reported seeing the symptoms of the early stage of Chagas disease. However only 5 promotores (30%, 5 out of 19) can correctly identify acute Chagas Disease and none knew that Chagas Disease had chronic sequelae. Currently there is no cure for Chagas disease and public health efforts have aimed to prevent the transmission by education and implementing bed nets to prevent infections. The success of these implementations relies on the recognition of Chagas disease among the indigenous promotores who are in a position to be the first to recognize the signs of acute Chagas disease. The results of our survey demonstrated that less than half of the indigenous promotores in Amazonia Ecuador along the Napo River had knowledge of Chagas disease. Chagas is reported to be present in the region, however there is little evidence that it can be reliably reported by the local indigenous promotores.

INTRODUCTION:

Chagas is a serious disease without cure. Its adverse affects can lead to serious complications that result in death and a shortened life expectancy. Among people indigenous to the Amazon regions, Chagas may be an endemic disease that is on the rise due to a changing migratory population and large-scale population movements from coastal Chagas endemic region of Ecuador towards the Amazon Basin. The parasite *Trypanosoma cruzi* carries Chagas disease, a chronic illness that has serious health implications, worldwide it is estimated that between 16-18 million people are infected with Chagas (CDC 2004) and of those infected, approximately 50,000 people will die each year. This study will be the first to examine the knowledge of local indigenous health practitioners in the recognition of Chagas disease. It is estimated that approximately 1.6% of the population of Ecuador is infected with Chagas disease, this indicates that there are up to 200,000 people affected and nearly 25% of the population are at risk.

In Ecuador, three main factors have characterized the transmission and persistence of Chagas disease: 1) The presence of *Trypanosoma cruzi* transmission in endemic areas of coastal and southern Ecuador 2) The variety of Triatomine insect vectors capable of *T. cruzi* transmission and 3) The presence of a large population at risk due to the substandard housing infrastructure and dwelling (Rizzo 2003). Altogether these factors have led to an estimate that 2.4-3.8 million people in Ecuador are exposed to the risk of *T. cruzi* transmission (Aguilar 1996). It has previously been reported that the most endemic regions of Chagas disease in Ecuador is in the provinces of the south coastal region and the central northern pacific coast (Abad-Franch 2002).

The Amazon region of Ecuador has been protected from *T. cruzi* transmission by the Andes mountain range which separates the Amazon Basin from the costal Chagas endemic region, making a physical barrier. In the Amazon region there are three subclasses of Triatomine bugs (*Reduviidae pictipes*, *Reduviidae rubsutus*, and *Panstrongylus geniculatus*) endemic to the area capable of *T. cruzi* transmission (Aguilar 1999) as disease vectors. Although the vectors for Chagas disease are present, historically the disease has largely been confined to the region west of the Andes

Mountain which creates a geographic barrier. However with the influx of migratory workers from the coastal endemic areas and the availability of transportation, there is data to suggest that Chagas disease is spreading into the Amazon region (Chico 1997).

Serological surveys have demonstrated that between 1-2% of the people in the Amazon Basin may unknowingly be infected with Chagas (Chico 1997) and the seroprevalence of Chagas is reported to be 2.4% in the Amazon Basin (Grijalva 2003). The rate is variable among different communities, and age stratification. Elder people (adults 50 years of age or older) have a higher prevalence than children. Among children ≤ 10 years, there is a range from 1.2%- 4.8% depending on the community they live in, the high rate of infection suggests that a peri-domestic transmission rather than sylvatic transmission is more important (Chico 1997).

As Chagas may often present with a vague acute phase and a long latency period, the recognition of Chagas becomes difficult especially without the aid of serology. Chagas disease can be hard to detect in the population because it has a short acute phase with similar signs and symptoms of the flu and a long latent asymptomatic phase that is anywhere between 10-40 years. The best means of detecting Chagas disease is serology or the recognition of the Romana's sign which is a transient unilateral peri-orbital edema. Given its chronic nature, Chagas is a disease that will increase in prevalence among the people of the Amazon region and recognition of the symptoms associated with it will be helpful in assessing public health prevention methods.

This medical research project proposes an exploratory analysis of the impact of Chagas disease (*Trypanosoma cruzi*) in the Amazon region of Ecuador. In particular, it is interested in the recognition of Chagas by the local indigenous promotores. The promotores are important because they serve as indigenous health practitioners in the village where doctors are not available. There is usually one promotore per village and they are also in a unique position to be the first to see signs and symptoms of Chagas disease. This study is designed to examine the knowledge of local indigenous promotores in the recognition of Chagas disease. This research study was done with the approval and support of the Universidad Tecnologica Equinoccial (UTE), in Ecuador.



Fig 1. To the right are villages along the Amazon River, Rio Napo in Northeastern Ecuador visited in this study. The nearest town Coca is approximately 140 miles away.

METHODS:

1. Survey questionnaires were conducted in face-to-face-interviews with indigenous promotores who lived and worked in the communities along the Napo River of the Orellana province in Northeastern Ecuador Amazonia. The interviewees are local health practitioners of the indigenous villages along a 40 mile stretch of the Rio Napo, nestled between the villages/communities of Frontiers de Ecuador and Chiro Isla (fig 1). The promotores must satisfy the criteria of working as a promotore for at least 1 year and being recognized as a promotore by the village he/she works in. Survey and interview questionnaires (see appendix 1) were conducted in Spanish and later translated into English. The questions are composed of simple yes/no, multiple choice, and open-ended questions. A total of 20 questions were utilized in the interview and tape recorded to ensure the accuracy of the response. They targeted areas such as knowledge of acute and chronic stages of Chagas disease, signs and symptoms, knowledge of Chagas transmission vectors, and susceptibility of Chagas infection. The questionnaire was developed based on clinical knowledge of the symptoms of Chagas disease.

2. Knowledge of Chagas disease was assessed by a multiple choice and open answer questionnaire that included both conditions that are associated with the disease and conditions that are not. Multiple choice questions were used to explore symptoms, timing of onset, and general characteristic of Chagas disease. Participants were asked to verbally complete a questionnaire that assesses their ability to recognize Chagas disease in either acute or chronic form. Open-ended questions were used to assess the recognition of the Triatomine bug, symptoms, and other general knowledge such as whether the promotores live in an environment that makes them susceptible to Chagas disease, whether they've been bitten by the insect that could serve as a vector for Chagas disease transmission, etc. Other variables are also measured such as the environment and condition of housings in the villages surveyed, method of village construction such as bamboo/wood vs. concrete/brick, the usage of any type of bed netting, and domestic livestock available in the vicinity.

3. Dr. Dale Alverson, my mentor, have made trips to Ecuador on July, 2005 to establish contact with the local UTE counterparts and June, 2006 to aide in the research project of other medical students interested in the impact of the petroleum mining. From April-May of 2007, we conducted our interviews and surveys in the Orelleans province in Amazonia Ecuador.

RESULTS:

Demographics

Communities total: 22

Communities surveyed: 18

Promotores surveyed: 19

The region that we are surveying is in the Orelleana province of the Amazon Basin, in the Northeastern Ecuador located on the banks of the Napo River. The Orellana province can be accessed by the Rio Napo flowing form the city of Coca to Frontiers de Ecuador, close to the Peruvian Border. This stretch of the river is approximately 140miles in length. in the Aguarico Provincia de Orellana. There are 22 communities that make up

the Orlleans province, including a municipal, Nuevo Roca Fuerte and a large town, Tiputini.

The survey included 18 of the 22 communities present, covering 81.8% of the entire available communities in this area. Of these communities, three were excluded from analysis because they did not have a promotor and thus a survey could not be conducted. Two of the three communities without a promotor did not have enough people living in the community to sustain one and thus used the promotores of nearby villages instead. The remaining community without a promotor was the town of Nuevo Roca Fuerte which included a hospital, doctors, nurses, and a dentist. It served as the municipal and center for health care in the Orlleans province along the Rio Napo.

Of the remaining 15 communities with promotores, there are four communities that shared two promotores. The communities of San Vicente and Centro Ocaya shared one promotor and the communities of Yana Yaca and Chiro Isla shared another promotor. The remaining 11 communities had between 1-3 promotores each.

With the exception of Nuevo Roca Feurte and Tiputini, the housing infrastructures in the villages/communities along the Rio Napo were similar. Villages included housing made from predominately wood, thatch, brick and aluminum with very little differences between villages in terms of housing and building infrastructure. Some villages have a central housing structure for community functions. All villages and communities have permanent open space with the absence of windows and doors in community structures and homes. Neuvo Roca Feurte and Tiputini has the addition of permanent cement structures and homes with window screens that are often seen in official or government buildings, but they still included homes with permanent open space and structures made from wood, thatch, or aluminum.

The communities also kept similar types of livestock and animals. They had chickens, dogs, goats, cows, monkeys and turkeys near living quarters. Larger communities had more animals but the types of domestic livestock were largely similar. The size of the

villages/communities range from 8 to 140 houses, with a rough estimate of 3 to 9 people per house for the communities we visited.

A total of 19 interview-surveys were conducted for the 15 communities with promotores, all of them were face-to-face with one interpreter asking the question and two people recording down the answer. In addition, we utilized a tape-recording device simultaneously during the interview process and reviewed the tape after the interview to ensure the accuracy of the information recorded.

All of the promotores surveyed meet the criteria of having at least one year of experience, being recognized in the community as a promotor, and residing in the communities. The promotores were predominately male (78.9%, 15 out of 19 surveyed) and they ranged in age from 23-52 years of age with anywhere from 1-20 years of experience. A slight majority of the promotores had family members who were also promotores (57.9%, 11 out of 19). The educational experiences of the promotores differ widely between communities. Some promotores have little to no requirements to become a promotore whereas others work with a local promotores program and are required to travel to the nearest city Coca for continued education three times a year.

Questions pertaining to Knowledge of Acute Chagas Disease: (Questions 1 to 10)

Questions #1-10 on the questionnaire addressed the recognition of the acute stage of Chagas disease, a person is considered to be able to recognize the acute stage of Chagas disease if they can answer six of the ten questions correctly and can also correctly identify at least 2 of the symptoms associated with the acute stages of Chagas Disease. Of the 19 promotores that were surveyed, 8 of them report seeing the Romana sign. However only 5 promotores (30%, 5 out of 19) have correctly answered six of the ten questions that relate to knowledge of acute Chagas Disease. These promotores came from three different villages/communities (1 Huririma, 2 Puerto Quinche, and 2 Tiputini).

Questions pertaining to knowledge of chronic sequelae of Chagas Disease (Questions #11 to 15)

A person is considered to have knowledge of the chronic implication of Chagas Disease if they are able to answer four of the five questions correctly and indicating at least 2 of the chronic conditions associated with Chagas. Of the 19 promotores surveyed, none knew that Chagas Disease had chronic sequelae. Even among the 5 promotores who knew about the symptoms associated with acute stage Chagas Disease, none knew of the chronic possible sequelae associated with Chagas.

**Questions pertaining to Knowledge of the Triatome vector for Chagas Disease:
(Questions 16 to 20)**

Questions #16-20 explore the recognition of the Triatome bug, the disease vector for Chagas disease. In the promotores we interviewed, all 19 of them (100%) are able to recognize the Triatome bug when shown a picture. They can correctly identify it by name, “chinchu” bug, and are also able to describe the symptoms associated with being bitten by the chinchu bug, with one promotore having the additional knowledge that there were three subspecies of the Triatome bug in the Amazonia. Everyone surveyed were also able to correctly identify the habitation of the Triatome, where they are usually found, and their nightly feeding habits. The promotores also report knowing people bitten by the Triatome bug and themselves being bitten by the Triatome. Eighty nine percent of the promotores surveyed (17 out of 19 people) stated that they have been bitten by the bug on many occasions; the remaining two lived in a bigger town, Tiputini, and have only been bitten occasionally. When asked whether or not the Triatome bug can transmit a disease, three promotores believed that it did not. The remainder of the promotores believed that the Triatome did transmit a disease, 8 felt that the disease is leishmaniasis, 6 stated Chagas, 1 believed it was malaria, and 1 stated headache.

DISCUSSION:

1. Outcome of Study

The results of our survey demonstrated that less than half of the indigenous promotores in the Northeastern part of Amazonia Ecuador along the Napo River had knowledge of Chagas disease. Only three of the 22 villages in our survey population had promotores

who were able to recognize the acute state of Chagas disease. Of all the promotores surveyed, none of the promotores knew of the chronic implications associated with Chagas disease. When we queried for knowledge of the vector responsible for the transmission of Chagas, there was a wealth of information. Everyone surveyed was able to identify the Triatome bug, know its habitat, feeding habits, and can accurately describe the symptoms associated with being bitten by the Triatome bug. However knowledge of the vector insect does not translate to knowledge that the Triatome bug is capable of Chagas transmission. Many promotores mistakenly believe that the Triatome insect is responsible for the transmission of leishmaniasis. In addition, the identification of the Romana's sign does not necessarily correlate with the knowledge of Chagas disease infection. Chagas disease may be present in the region but its recognition is not pervasive, and there is very limited knowledge of Chagas disease even among the promotores that are able to recognize it. There is a lot of misinformation about the disease vector itself.

Chagas is reported to be present in the Amazonian Ecuador however there is little evidence that there are enough symptomatic cases to be identified. Since Chagas is a very complex disease with a short window of recognition and a requirement of years before the appearance of a sequelae, the results of our study does not come as a surprise. Serological studies done in the Amazonia region of Ecuador have reported that 1% of the population has Chagas disease and we really cannot comment on whether the region we have surveyed truly reflects this data. We can only say that the local promotores/health practitioners have a limited knowledge of the disease. As Chagas may often present with a vague acute phase and a long latency period, the recognition of Chagas becomes difficult especially without the aid of serology. Given its chronic nature, Chagas is a disease that will increase in prevalence among the people of the Amazon region and recognition of the symptoms associated with it will be helpful in assessing public health prevention methods intervention, and education.

In conducting our study, we have not missed the chance to educate as well as gain knowledge. In any research study, the conduction of the study can have an impact of the

study population. In this situation we hope that the process of conducting the interview itself can act as a means of increasing awareness of Chagas disease. At the end of every interview, we have taken the effort to thank the promotores for their valuable time and also to explain why we conducted the interview and why Chagas disease was important. We use the survey as a means of gaining information about the knowledge base of the indigenous promotores and also as a way of sharing information in an effort to give back to the communities we have surveyed. Therefore the interview serves not only as a way to assess the knowledge also as a means of increasing public health awareness.

Ultimately, we hope that this project will bring more recognition to the obstacles faced by the people of the Amazon region in relation to Chagas and prompt more research studies, prevention methods, and international aid.

2. Obstacles to achieving overall objectives.

The major strength of this proposal is the research question that has previously been unexplored, the answer to which will be both educational and insightful in the recognition of Chagas disease in the Amazon region.

There were several obstacles to achieve overall success. First and foremost is the remoteness of the area being studied. The trip from the nearest city to our base camp is anywhere from 8-18 hours by ferry and to get to the individual villages from our base camp we needed to rely on the services offered by locals and the availability of their motorboat. The difficulty of transportation and the time constraint led to the inability to cover all of the villages in the Agurico Province. Another limitation of this research is that this study uses largely self-reported data from local practitioners that is subject to biases as it is not backed by any serological test or techniques.

In villages where there was more than one promotores, it was difficult to isolate the promotores for separate questioning to ensure that the answer given by one promotore did not influence another. We chose not to do this for cultural reasons since our arrival in a village has brought a lot of curiosity and everyone was interested in seeing and knowing

what was going on. We did not want to appear secretive in any way and thus the environment under which we queried the promotores in situations where there were two or more promotores in a village is not ideal. Most of the questioning was done in front of the whole village looking on. As a consequence we have noticed that in situations where we have questioned two or more promotores simultaneously, we have received answers which are more or less the same with very subtle differences in their response. We have made every effort to allow each promotores to talk for him/herself but unfortunately people are often influenced by their peers. We consider the results we received from simultaneous interviews to be separate but must acknowledge that it could positively skew the results of our survey. Of the 5 promotores that are considered to have knowledge of the acute stages of Chagas Disease, two pairs were done in this fashion, thus only 3 villages had promotores that could recognize the acute stages of Chagas disease.

3. Common themes found in this survey among the indigenous promotores

In our investigation, we found the promotores to be very open to inquiries and willing to participate in our study. There is a variety of education experience among the promotores. Some have training with the requirement for continuing education from the closest city at least once a year whereas others act in the same capacity of a promotore and are recognized as a promotore but do not attend classes. In addition, we also found one exceptional promotore who worked for the government, had training with a field microscope, and parasitic disease education. He lived in a larger village and had the responsibility of tracking malaria and dispensing malaria medication. Of course this was an outlier as most of the promotores in the region did not have microscopes, medicine, and did not work for the government. One of the common themes we have noticed from talking to the promotores is a pervasive need for more education and training and a concern for inadequate health care.

The things that promotores wanted were universal. They include a common need for more doctors' visit, and more routine visit as oppose to the regular vaccination visits twice a year. There is also a request for dental visits. A need for medications against

common ailments such as malaria, flu, cold and other common medications along with medical equipments such as blood pressure cuffs, radio for communications, suturing equipments, and books. A means of quick transportation for medical emergencies is also a very important need among the promotores. Many of the promotores understand that there are inherent difficulties associated with a quick and efficient means of transporting the sick in the Amazon jungle. People along the Napo river have no means of walking to the doctor, they must rely on boats which are sometimes not available, and when they are available may require a trip that may take 3 hrs or more. Some promotores expressed the need for mosquito netting, stating that although the government has issued mosquito netting, they get worn out and eventually end up with holes rendering them useless. The need to work with other promotores in the region and a way of networking has also been expressed as a need in the area. Some of the promotores are interested in a means of communicating with each other. They believe that a radio communications can be useful as a means of sharing information and also as an aid for allocating resources such as the availability of boats in an emergency.

From this research experience, I've learned that education is a very important component of healthcare and disease prevention. In areas that are remote, this need is even more important and crucial. In the indigenous population along the Rio Napo, there is a scarcity of some of the most basic health needs such as clean water, adequate health care, dental care, and public health education. I've also learned that the people living along the Amazon River Basin are very generous with their time and knowledge, and willing to learn as well as teach.

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Appendix 1: Chagas Questionnaire**Chagas Disease Questionnaire
Encuesta Sobre el Mal de Chagas****DEMOGRAPHICS:**
DATOS DEMOGRÁFICOS:

Name:
Nombre:

Gender: M / F
Sexo: Femenino / Masculino

Age:
Edad:

Years in practice:
Años de experiencia:

Healers in the family? Yes / No
¿Hay curanderos en la familia? Sí / No

Price for service:
Precio por servicio:

COMMUNITY INFORMATION:

Housing type: Wood/ Thatch/ Brick/ Other:

Presence of Peridomestic livestock: Y N
Type:

Number of houses:

Location:

Latitude:

Longitude:

Altitude:

QUESTIONNAIRE:**ENCUESTA:**

Q1. Have you treated people with swollen faces that look similar to this? (picture 1)
¿Ha atendido a personas con la cara hinchada como en la fotografía # 1?

⊕ (No) Skip to question# 5
(No) Pase a la pregunta # 5

⊕ (Yes) Ask the following:
(Sí) Pregunte lo siguiente:

1. Can you tell me more about this symptom?
¿Me puede explicar más sobre este síntoma?

2. How long does the swelling last? _____ wks
¿Cuánto tiempo dura la hinchazón? _____ semanas

3. Is it painful or painless?
¿Es dolorosa o sin dolor?

4. Does it feel normal or warm?
¿Lo hinchado se siente normal ó caliente?

5. Does it happen to one side of the face or both sides?
¿La hinchazón sucede en un lado de la cara ó en ambos lados?

6. Does it happen more in adults or children?
¿Le sucede más a los adultos ó a los niños?

Q2. Is the swelling associated with any other symptoms?
¿La hinchazón está relacionada con otros síntomas?

⊕ (No) Skip to question# 3
(No) Pase a la pregunta # 3

⊕ (Yes) Ask the following:
(Sí) Pregunte lo siguiente:

1. What other symptoms do you see with the swelling?
¿Qué otros síntomas observa con la hinchazón?
-

7. Do you know if it is associated with:
¿Sabe usted si está relacionada a lo siguiente?
- a. Fever
Fiebre
 - b. Chills
Escalofríos
 - c. Fatigue
Fatiga
 - d. Headache
Dolor de cabeza
 - e. Fast heart beat
Latido del corazón rápido
 - f. Slow heart beat
Latido del corazón lento
 - g. Irregular heart beat (arrythymia)
Latido del corazón irregular (arritmia cardíaca)
 - h. Swollen liver
Hígado inflamado
 - i. Swollen spleen
Bazo inflamado
 - j. Swollen feet
Pies hinchados
 - k. Swollen lymph nodes
Nódulo linfático (glandula) inflamado(a)
 - l. Anemia
Anemia
 - m. Death
Muerte

n. Other, please specify: _____

Otro, por favor especifique: _____

Q3. Do you think that the swelling is related to any other symptoms that occur later?
¿Cree usted que la hinchazón está relacionada a otros síntomas que se presentan después?

⊕ (No) Skip to question# 4
(No) Pase a la pregunta # 4

⊕ (Yes) Ask the following:
(Sí) Pregunte lo siguiente:

1. What other symptoms may appear later?
¿Qué otros síntomas se presentan después?

2. When do these symptoms appear?
¿Cuánto se demoran en aparecer esos síntomas?

a. Weeks
Semanas

b. Months
Meses

c. Years
Años
if years, ask how many: _____ years
si se demoran años pregunte cuantos años: _____

3. Do you know if any of the following is related to the swollen face?
¿Sabe usted si alguno de los siguientes síntomas está relacionado con la inflamación en la cara?

a. difficulty swallowing
dificultad al tragar

b. difficulty urinating
dificultad al orinar

c. coughing at night

- tocer durante la noche
- d. coughing blood
tocer sangre
 - e. weight lost
pérdida de peso
 - f. swollen feet
hinchazón en los pies
 - g. vomiting
vómito
 - h. vomiting blood
vómito con sangre
 - i. painful swallowing
dolor al tragar
 - j. abdominal distention
distensión (inchazón, inflamación) abdominal
 - k. constipation
estreñimiento
 - l. shortness of breath with exercise
falta de aire cuando hace ejercicio
 - m. difficulty sleeping flat
dificultad al dormir boca arriba
 - n. difficulty sleeping at night
dificultad al dormir durante la noche
 - o. heart problems
problemas del corazón

if heart problems, ask what type:

si hay problemas del corazón pregunte ¿Qué tipo de problemas?

Q4. What do you think is the cause of this problem?
¿Qué cree usted que sea la causa de este problema?

Q5. Have you seen this insect? (picture2)
¿Ha visto este insecto? (fotografía # 2)

⊕(No) Skip to question#7
(No) Pase a la pregunta # 7

⊕(Yes) Do you have a name for this insect?
(Sí) ¿Cómo se llama? _____

Q6. Have you been bitten by this insect?
¿Lo ha picado este insecto?

⊕(No) Go to question#7
(No) Pase a la pregunta # 7

⊕(Yes) Ask: Rarely / Occasionally / Many times
(Sí) Pregunte cuantas veces: casi nunca / varias veces / muchas veces

Q7. Have you heard of Chagas Disease?
¿Ha escuchado hablar del Mal de Chagas?

⊕(No) Thank you very much. That's all the questions I have.
(No) Muchas Gracias. No tengo más preguntas para usted.

⊕(Yes) Please tell me what you know about Chagas Disease:
(Sí) Por favor dígame lo que sabe acerca del Mal de Chagas:

Thank you for your participation.
Gracias por participar en esta encuesta.

Picture1



Picture2



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