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ORIGINAL ARTICLE

Knowledge of residents about Chagas disease and its vectors in a municipality of Juruá, Amazonas

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Abstract

Introduction: Chagas disease (CD) is an infectious condition caused by the protozoan *Trypanosoma cruzi*, primarily transmitted by vectors. Understanding the diversity of these vectors in a region is crucial for disease prophylaxis, with vector control being the main measure to reduce its incidence. Therefore, it is essential to enhance knowledge about triatomines to guide prevention and promotion actions, with active community participation.

Objective: to describe residents' knowledge about Chagas disease and its vectors in a municipality in the Western Amazon of Brazil.

Methods: the data was collected by means of an interview with the application of a semi-structured questionnaire containing objective and subjective questions to residents over 18 years of age in the urban area of the municipality of Guajará - AM in their homes.

Results: out of 400 participants, 75% reported having heard of Triatomines. 65.38% of those who encountered a suspected insect in their home or surroundings claimed to have killed it and most could not indicate where the insect should be taken (91.25%). Only 40.25% correctly identified the triatomines, with *Rhodnius montenegrensis* (22.75%) being the most chosen. Most were unaware of signs/symptoms (70.25%), transmission routes (52.75%), and preventive measures (62.5%) related to CD. Regarding dietary habits: 93% consumed açaí (*Euterpe olerácea*), 88.75% buriti (*Mauritia flexuosa*), 65.5% sugarcane (*Saccharum officinarum*), 50.5% bacaba (*Oenocarpus bacaba*), 50.25% patoá (*Oenocarpus bataua*), and 75.75% game meat.

Conclusion: the research revealed several knowledge gaps on the topic, emphasizing the need to intensify health education actions.

Keywords: public health surveillance, health education, community participation, Triatominae.

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Authors summary

Why was this study done?
Chagas disease (CD) is an infectious condition caused by the protozoan *Trypanosoma cruzi*, transmitted mainly by vectors. In this sense, the knowledge of the diversity of these vectors occurring in a region is of fundamental importance for the prophylaxis of the disease, where vector control is the main measure to reduce the incidence of the disease, thus the importance of expanding the knowledge about triatomines is evident, in order to guide the development of prevention/promotion actions, where the community participation is of fundamental importance.

What did the researchers do and find?
This survey found that among the 400 interviewees, 75% reported having heard of the triatomine; 65.38% of the individuals who found a suspicious insect in their home/peridomicile reported having killed it; the majority were unable to say where the insect should be sent (91.25%); only 40.25% correctly identified the triatomine, with *R. montenegrensis* (22.75%) being the most chosen. The majority were unaware of the clinical manifestations (70.25%), forms of transmission (52.75%) and preventive measures (62.5%) related to CD.

What do these findings mean?
Among the results found, it is possible to see that even though the percentage of people who recognize the triatomine is positive, they do not know what to do when they find it or who to hand it over to, and this shows the need to strengthen entomological surveillance in the municipality. This research allowed us to evaluate passive surveillance, which relies on the participation of the population, and thus observed that there is a need to develop strategies for health education aimed at health surveillance and especially entomological surveillance.

Highlights
Knowledge about the Chagas vector is acquired through educational institutions and the media.
The majority of respondents do not know how to identify triatomines and have a limited understanding of the symptoms of Chagas disease.
It was found that little action by health unit professionals regarding Chagas disease in the daily routine of the service, which reflected in the population's little knowledge about the disease and what measures should be taken in case of finding the vectors and their residences.

INTRODUCTION

Chagas disease (CD), also known as American Trypanosomiasis, is an acute and chronic infectious condition caused by the protozoan *Trypanosoma cruzi*[1,2]. This illness is endemic in low-income populations in the Americas[3,4] and is considered the fourth most prevalent parasitic disease worldwide, with approximately 300,000 new cases reported annually[5].

The infection presents various transmission mechanisms, including the vectorial route[6,7], oral[6,8,9], maternal-fetal, blood transfusion, organ transplantation, laboratory accidents[1,2,10,11], and even the sexual route[10,11].

The vectors of CD are hematophagous hemipteran insects, belonging to the family Reduviidae and subfamily Triatominae[12], predominantly found in regions with tropical and subtropical climates, comprising 159 species (including five fossils) described[13-20].

Of the more than 30 species of hematophagous insects present in the Amazon, 22 occur in the Brazilian Amazon[21,22]. In the state of Amazonas, 13 species are described[23-26].

In the state of Amazonas, the form of transmission that has generated the largest number of cases, with great epidemiological and social impact, is oral, directly related to the consumption of traditional drinks such as açaí (*Eutherpe oleraceae; E. precatoria*) and patoá (*Oenocarpus bataua*)[27]. The first outbreak of the disease by oral transmission was recorded in 2004, in nine people in the municipality of Tefé, after consumption of contaminated açaí[28]. In the last two decades, numerous acute cases related to oral transmission have been recorded, with six outbreaks in the state of Amazonas[29-33].

Because it is a disease mainly transmitted by vectors and has a wide geographical distribution[34], knowledge of the diversity of triatomines occurring in a region is importance for disease prophylaxis, as these insects are the "link" of this illness[35]. Thus, providing monitoring of these vectors and improving the information system for the community regarding the prevention of CD may eventually decrease the transmission of the infection[36].

One of the strategies used to monitor a population is the application of questionnaires to assess people's knowledge and perception, providing a view of the current situation of health surveillance and local knowledge, which is a cheap and effective strategy. The present study aimed to describe the knowledge of residents of the city of Guajará, AM, Brazil, about Chagas disease and its vectors.

METHODS

The research was conducted in the municipality of Guajará, located in the interior of the state of Amazonas and belonging to the Northern Region of Brazil. It has a territorial area of a little over 7,583.534 km², is located on the left bank of the Juruá River and is approximately 1,600 kilometers in a straight line from Manaus, the capital of the state[37].

Data collection took place from May to July 2023. The data collection instrument used was a semi-structured form containing both objective and subjective questions, aiming to gather information about the population characteristics (age, sex, skin color, education level, and estimated monthly income), as well as questions about the "Triatomine" insect (correct identification of them); actions taken when encountering the insect; whether they identify such insect as a potential disease transmitter; knowledge about Chagas disease (signs, symptoms, transmission methods, and prevention).

During the interview, participants were shown a board containing color photographs of 10 insects to assess whether they correctly recognized the triatomines (supplementary material 1). The exemplified groups are

insects that are usually confused with triatomines. Letters A, B, and C are beetles, D and I are predatory bugs, E and J are plant-feeding bugs, and F, G, and H are triatomines.

The form was applied to residents in urban areas, with one participant per household. The approach was through home visits, where researchers went to the household (randomly selected by convenience sampling), and the individual (over 18 years old) present in the residence was invited to participate.

The sample size calculation was based on the number of inhabitants of the municipality (which, according to the Brazilian Institute of Geography and Statistics (IBGE), is 17,193 inhabitants)[37], with a confidence level of 95% and a margin of error of 5%, resulting in a sample composed of 376 individuals.

In multiple-choice questions, the frequency of response for each statement was evaluated. To compare the frequency of categories, the Chi-square test was adopted, using IBM SPSS Statistics [25] software. In questions where there were response categories with a value of zero, the test could not be employed. The analyses were performed considering gender, type of housing, and level of education.

This work followed the ethical terms agreed in Resolution nº 466/12 and Resolution nº 510/16 and was subject to the approval of the Research Ethics Committee (CEP) of the Federal University of Acre - UFAC, for the research to be carried out, as it involved human beings. The collection was carried out after approval by the Research Ethics Committee - CEP (CAAE: 66209422.3.0000.5010).

RESULTS

Most of the interviewees were female, aged 27 to 35, of mixed race, and native to Guajará - Amazonas, followed by Cruzeiro do Sul - Acre. The majority reside in mixed residences (masonry and wood) and have completed high school. Regarding occupation, the majority were public servants, followed by homemakers and self-employed individuals, with a monthly income mainly ranging from 1 to 3 minimum wages (table 1).

Table 1: Data stratified by sociodemographic variables of the interviewed residents in the municipality of Guajará, Amazonas

Variable	Classification	N	Percentage
Gender	Male	148	37%
	Female	252	63%
Age group	18- 26	85	21.25%
	27-35	95	23.75%
	36-44	82	20.5%
	45-53	52	13%
	54-62	43	10.75%
	63+	43	10.75%
Color/Race	White	64	16%
	Black	38	9.5%
	Brown	295	73.75%
	Yellow	3	0.75%
Place of Birth	Guajará – AM	167	41.75%
	Ipixuna – AM	80	20%
	Eirunepé - AM	02	0.5%
	Tapauá - AM	01	0.25%
	Manaus - AM	01	0.25%
	Cruzeiro do Sul -AC	128	32%
	Mâncio Lima – AC	04	1%
	Tarauacá – AC	03	0.75%
	Porto Walter – AC	02	0.5%
	Rodrigues Alves – AC	02	0.5%
	Marechal Thaumaturgo - AC	02	0.5%
	Rio Branco – AC	01	0.25%
	Other	05	1.25%
	No information	02	0.5%
Type of Housing	Masonry	142	35.5%
	Wood	93	23.25%

Table 1: Data stratified by sociodemographic variables of the interviewed residents in the municipality of Guajará, Amazonas

Variable	Classification	N	Percentage
	Mixed	165	41.25%
Education	Illiterate	31	7.75%
	Elementary School	61	15.25%
	Incomplete Elementary School	113	28.25%
	High School	153	38.25%
	Higher Education	42	10.5%
Occupation	Public Servant	86	21.5%
	Homemaker	83	20.75%
	Self-Employed	55	13.75%
	Retired/Pensioner	51	12.75%
	Healthcare Worker	44	11%
	Unemployed	30	7.5%
	Farmer/Fisherman	31	7.75%
	Student	12	3%
	Housekeeper	04	1%
	Lawyer	01	0.25%
	Salesperson/Bar Attendant	01	0.25%
	Babysitter	01	0.25%
	Açaí Producer	01	0.25%
Monthly Income (Minimum wage)	Less than 1	88	22%
	1 to 3	280	70%
	Above 5	14	3.5%
	3 to 5	12	3%
	Decline to answer	04	1%
	Don't know	02	0.5%
Total	400	100%	

Legend: N (sample number); AC (Acre); AM (Amazonas).

Regarding knowledge about vectors (table 2), 80.75% of the interviewees reported having heard about triatomines, with the main sources of knowledge being mentioned as Radio/TV/Internet, community, and educational institution/school/technical course. It is worth mentioning that this question could have multiple options marked, so an individual could have heard about the insect on the radio, but also in a healthcare facility, for example.

Table 2: Knowledge about the vector "Triatomine"

Variable	Classification	N	Percentage
Have you ever heard of the Triatomine insect?	Yes	323	80.75%
	No	77	19.25%
Have you ever found an insect in your home that you thought was a Triatomine?	Yes	13	3.25%
	No	371	92.75%
	Does not know/Unsure	16	4%
Have you ever found an insect in the surrounding area of your home that you thought was a Triatomine?	Yes	21	5.25%
	No	363	90.75%
	Does not know/Unsure	16	4%
What did you do when you found the insect?	Killed	17	65.38%
	Ignored	04	15.38%

Continuation - Table 2: Knowledge about the vector "Triatomine"

Variable	Classification	N	Percentage
	Removed from the location without killing	03	11.53%
	Does not remember/no information	02	7.69%
	Not applicable	374	93.5%
Do you know where to send the vector if you find it in your home or surrounding area?	Yes	35	8.75%
	No	365	91.25%
Are you afraid of the Triatomine insect?	Yes	191	47.75%
	No	209	52.25%
Have you ever been bitten by a Triatomine?	No	394	98.5%
	Does not know/Unsure	06	1.5%
Do you know anyone who has been bitten by a Triatomine?	Yes	12	3%
	No	388	97%
Do you do anything to prevent the insect from entering your home?	Yes	128	32%
	No	244	61%
	Does not know/Unsure	28	7%
Do you know if the Triatomine insect transmits any diseases?	Yes	324	81%
	No	76	19%
Total	400	100%	

Legend: N (sample number).

Statistical analysis showed that there are more men who have heard about the insect (p=0.003). The test also revealed significance between the level of education and having heard about the vector at some point in life (p=0.001), with those who had completed/incomplete high school and completed higher education standing out.

Among the interviewees, 3.25% reported finding triatomines inside the home and 5.25% in the peridomicile, with no relationship found between the type of housing and encountering the suspected insect inside the home (p=0.496).

The places where triatomines were found inside the homes were: living room, balcony, kitchen, bedroom, laundry area, and entrance of the house. It's worth noting that one individual reported two encounters in their home, one in the kitchen and another at the entrance. As for the peridomicile, they were found near dense vegetation, acai bunch, vegetables, buriti bunch, and on the ground near an acai tree.

Regarding the actions taken after encountering the vector, the majority reported killing the insect (65.38%). It's important to mention that for this specific topic, the individuals who mentioned encountering the insects both inside the home and in the peridomicile were not summed up, as 8 individuals found the suspected insects in both locations and took the same action; thus, the action couldn't be counted twice.

Interviewees were asked if they knew where to send a suspected insect if found inside or outside the home. The majority (91.25%) didn't know where the triatomine should be sent. Among those who answered affirmatively, knowing where to send the triatomine, the following responses were given: Health Unit, Health Surveillance Foundation, sanitary surveillance, educational and research institutions, and Municipal Health Secretaria, but none mentioned taking actions to bring a suspected insect to the appropriate institutions.

Regarding the action taken upon finding a triatomine, as well as knowledge of where the insect should be taken, the test showed no significance between men and women.

Regarding fear of the vector, 52.25% responded no and 47.75% responded yes, mentioning the following reasons: causes diseases, can kill, bites humans, dangerous, venomous, frightening, contaminates acai, attacks the heart, and causes spots/wounds.

The survey inquired whether participants had experienced a bite from a suspected triatomine insect. About 2.5% confirmed having been bitten themselves, while 3% reported knowing someone who had encountered such bites, including friends, acquaintances, and family members like cousins and aunts.

Regarding preventative measures at home, 32% of respondents acknowledged taking action. Their strategies included maintaining cleanliness within the home and surrounding areas, employing insecticides, repellents, or incense, and ensuring the house remained closed during the night.

Individuals were asked if they knew if triatomines transmit any diseases, with the majority (81%) responding yes and mentioning the following names: Chagas disease, "barbeiro" disease, acai disease, heart problems disease, dengue, malaria, disease presenting lumps/wounds/itching on the body, and corona.

For the question about the identification of triatomines (table 3), the results showed that only 40.25% of individuals correctly identified the triatomines, with 22.75% choosing *R. montenegrensi*s, followed by 10.5% *E. mucronatus* and 7% *P. geniculatus*. Regarding those who answered incorrectly, the majority chose a type of bug, with 23% choosing a predatory bug and 8.5% choosing a plant-eating bug.

Regarding the knowledge block about Chagas disease (Table 4), participants were asked if they knew someone who has or had Chagas disease, where 10% responded yes, mainly mentioning friends/acquaintances and family members.

Table 3: Interviewees' responses after viewing the image board in descending order

Option chosen by the interviewee	N	Percentage
Letter D – Assassin bug	92	23%
Letter H - *Rhodnius montenegrensis*	91	22.75%
Letter F - *Eratyrus mucronatus*	42	10.5%
Letter J - Phytophagous bug	34	8.5%
Letter C – Beetle	30	7.5%
Letter G - *Panstrongylus geniculatus*	28	7%
Letter A – Beetle	23	5.75%
Letter B – Beetle	19	4.75%
Letter E - Phytophagous bug	17	4.25%
Letter I -Assassin bug	13	3.25%
Declined to give an opinion	11	2.75%
Total	400	100%

Legend: N (sample number).

Table 4: Knowledge about Chagas disease

Variable	Classification	N	Percentage
When the interviewees were questioned if they knew anyone who has or had Chagas disease.	Yes	40	10%
	No	360	90%
When the interviewees were questioned if they knew what health problems/situations CD can cause in humans.	Yes	119	29.75%
	No	281	70.25%
When the interviewees were questioned if they knew if DC has a cure.	Yes	232	58%
	No	84	21%
	Does not know/ Unsure	84	21%
When interviewees were questioned if they knew how it contracted DC.	Yes	189	47.25%
	No	211	52.75%
When the interviewees were questioned if they knew how to avoid DC.	Yes	122	30.5%
	No	250	62.5%
	Does not know/ Unsure	28	7%
When the interviewees were questioned if they already had participated of some activity about DC	Yes	28	7%
	No	372	93%
Total	400	100%	

Legend: N (sample number).

They were also asked if they knew what health problems/situations Chagas disease could cause in humans, where 29.75% responded yes. Among these, many gave responses associated with clinical manifestations of Chagas disease (such as heart problems, tachycardia, cardiomegaly, megacolon, and Romaña's sign), but a large number of responses were not associated with the disease, and some are also associated with other diseases in the region like malaria, making it difficult to assess the population's knowledge regarding this question.

Regarding those who answered correctly, it was found that having completed higher education significantly influenced (p=0.002) compared to other groups.

Participants were asked if they knew if Chagas disease is curable, with the majority responding yes (58%), 21% said the disease is incurable, and 21% could not answer this question.

The interviewees were asked if they knew how Chagas disease (CD) is transmitted, where only 47.25% responded affirmatively and described the transmission process. In this study, no alternatives were suggested to the interviewees; their responses were transcribed as mentioned by them and grouped into similar answers. Additionally, for this question, participants could provide more than one response.

The study revealed that insect bites were the most suggested mode of transmission by the interviewees. A good representation of transmission through triatomine feces/urine and ingestion of contaminated food was also obtained, mentioned by some of the participants.

Regarding knowledge of how to prevent CD, 30.5% responded positively. The majority listed environmental cleanliness and food hygiene as ways to prevent the disease.

Participants were asked if they had ever engaged in any educational activities related to CD at any point in their lives, with 93% responding that they had never participated in such educational activities.

Regarding dietary habits (data not presented in a table), it was reported that 93% consume acai (*Euterpe oleracea*), 88.75% consume buriti (*Mauritia flexuosa*), 65.5% consume sugar cane (*Saccharum* sp.), 50.5% consume bacaba (*Oenocarpus bacaba*), 50.25% consume patoá (*Oenocarpus bataua*), and 75.75% reported consuming game meat. It is worth mentioning that for this question, individuals could indicate more than one option, so the same individual could report consuming all the foods in question.

Individuals who reported consuming game meat were asked about the type and preparation of game consumed. Regarding the type of game, various animals were mentioned, including paca (*Cuniculus paca*), collared peccary (*Tayassu pecari*), white-lipped peccary (*Tayassu tajacu*), armadillo (*Dasypus* spp. *and Priodontes maximus*), deer (*Mazama* spp.), capybara *(Hydrochoerus hydrochaeris*), monkey (*Cebus* sp.) agouti (*Dasyprocta* spp.), tapir *(Tapirus terrestris*), quatipuru (U*rosciurus* sp.), quati (*Nasua* sp.), jaguar (*Panthera onca and Puma concolor*), turtle (*Chelonoidis* sp.), caiman jacaré (*Caiman* sp. *Melanosuchus* sp.), tinamou (*Crypturellus* sp.), guan (*Penelope* sp.), mutum (*Pauxi* sp.), curassow (*Aburria* sp.), stingray (*Potamotrygon* sp.) and electric eel (*Electrophorus* sp.). Regarding the type of preparation, the most commonly cited methods were boiled, roasted, and fried.

They were also asked about the use of mosquito nets/curtains, with the majority (60.25%) stating that they use these devices.

DISCUSSION

The majority of respondents having heard about Triatomines is considered a positive point, and the way they received this knowledge resembles other studies, where television[38], school, and local media were mentioned as the main sources of knowledge acquisition[39]. This demonstrates the role of educational institutions and journalism in knowledge acquisition.

Some authors mention that the sustainability of actions for prevention and control of Chagas disease (CD) necessarily depends on information and participation of the population, however, the Ministry of Health, as well as State Health Departments, do not have well-structured and active teams in the educational field, and there are also no structured actions in formal education prioritizing educational activities related to these diseases[38,40]. This was also observed in the present study, where there was little involvement of health units and health professionals in the daily service regarding the topic.

The percentage of people finding Triatomines inside their homes, approximately 3%, is much lower than those found in other states such as Rio Grande do Sul with 31.8%[38], Minas Gerais with 43.28%[41], and Bahia with 35.5%[42]. The states of Minas Gerais, Rio Grande do Sul, and Bahia are states where domiciliation and vector transmission of Chagas disease (CD) occur, which explains the observed percentage of Triatomines in households[42-45].

Rosenthal *et al.*[38] described an association with variables such as living or having lived in houses made of mud, adobe, or clay as a significant factor for encountering vectors, and living in masonry houses as a protective factor, unlike the present study where no such relationship with the type of housing was observed.

Regarding what to do when encountering a Triatomine, one of the worst attitudes is killing the insect (the most common response obtained in the present study), as this increases the possibility of direct contact with feces, urine, and hemolymph, consequently increasing the risk of contamination.

Other studies have also shown that killing the insect is one of the main attitudes of people and have indicated that this practice hinders surveillance efforts because the insects should be sent alive for parasitological examinations, and this information should be communicated to residents by Endemic Disease Control Agents (ACE), who should guide them on safety procedures when collecting these insects[40,46].

Villela *et al.*[40] also mentioned that some residents collected the insect in a container, a behavior that was not evidenced in the present study. This author also revealed that the majority of respondents either took the insects to Triatomine Information Posts (TIP) or handed them to an agent of the Chagas Disease Control Program (CDCP).

Similar to what was described by Dias *et al.*[41], where the most indicated locations by respondents were health services and schools, which in rural areas often function as TIPs.

Novais *et al.*[42] described in their study that although the municipality had TIPs, none of the interviewees mentioned this support point, thus demonstrating the inadequacy in the dissemination and information of this service, which is not provided by the state of Amazonas and its municipalities.

The lack of information among residents about the correct procedure for collecting and the proper destination of captured Triatomines in households may be related to the absence or misinformation about the Chagas disease control servicee[42]. Such observations prompt reflection on the need for greater dissemination about the correct handling of insects, which is essential to feed the system, thus reducing cases of underreporting of Triatomines and Chagas disease in the municipality[41]. It is worth mentioning that in conversations with professionals working at the Health Surveillance Foundation of the municipality of Guajará, they reported that there is no established flow for receiving suspected insects, nor are there specific posts for receiving them.

The number of respondents who reported being bitten by Triatomines themselves or knowing someone who has been bitten is lower than that reported by Dias *et al*.[41], which was 25.04%. Nonetheless, the data from the present study is concerning because if indeed these approximately 3% of respondents were bitten by Triatomines, it is noteworthy, particularly considering the Amazon region, where there are few records of vector transmission cases47.

Diverse studies demonstrate that a significant portion of the studied population is aware that Triatomines transmit Chagas disease (CD), with percentages of 85%[46], 92%39, and 100%[42]. Although the respondents in the present study mentioned other diseases or, in the majority, couldn't specify the name of the transmitted disease, this fact informs us that the study population recognizes the insect as a vector of some disease satisfactorily. However, health education actions regarding CD need to be strengthened in the focus municipality of the study to contribute to the effectiveness of entomological surveillance actions.

The species of Triatomines most recognized by the respondents belong to the genus *Rhodnius*, which has a broad geographic distribution in South and Central America[48]. In Amazonas, there are records of six species of this genus: *R. amazonicus*[49], *R. brethesi*[50,51], *R. montenegrensis*[25], R. paraensis[23], *R. pictipes*[52,53], and *R. robustus*[53]. Being the most representative genus for the state of Amazonas, this could explain the participants' accuracy in identifying the species indicated as a Triatomine.

Regarding those who responded by indicating predatory and phytophagous bugs, this can also be seen as positive because it demonstrates that these people have some notion, given that these species have similar morphology to Triatomines.

Regarding knowing people with CD, studies in Minas Gerais and Brasilia revealed that 59.18% and 51.2% responded affirmatively[41,46]. In both studies, friends and family members were reported among the groups of known individuals. The areas of the mentioned studies are considered areas of higher prevalence for CD; thus, it is expected that respondents know more people diagnosed with the disease, unlike what was observed in the present study.

Nearly 60% of the respondents stated that CD is curable, unlike other studies where the majority of respondents mentioned that there is no cure for CD[42,46].

The study revealed a deficit in knowledge among part of the population regarding the transmission of CD, but some demonstrated knowledge of transmission through contact with Triatomine feces/urine, as well as oral transmission.

Regarding how to prevent the disease and the entry of vectors into the residence, studies also reported cleanliness and organization of the environment as a preventive measure indicated by the respondents[40,41,46]. Although such actions are also applicable to other vector-borne diseases or diseases transmitted by improperly handled food, this information holds significant value since if such actions are indeed executed, they have an important potential for prevention.

A majority of the respondents also reported using mosquito nets, contrary to what was evidenced by Novais *et al.*[42], where only 25.8% of the studied population used this measure. The use of mosquito nets/curtains constitutes a preventive measure against vector transmission not only for Chagas disease (CD) but also for other vector-borne diseases such as malaria and dengue, for example. Although the population's use of this item may not be specifically directed towards CD prevention, it has a positive impact on it.

Considering that Triatomines are nocturnal and people are unprotected during this period, studies demonstrate that the use of mosquito nets/curtains contributes to reducing contact with the vector, thus reducing the possibility of blood meals and consequently transmission[54].

Regarding the dietary habits of the respondents, it is important to highlight that the mentioned fruits do not pose a primary risk, but rather their inadequate preparation with serious hygienic, manufacturing, and conservation deficiencies[55]. This statement is particularly important to avoid stigmatizing the production and/or consumption of foods that are important sources of calories and nutrients for the population that consumes them, as well as sources of work, income for regional gastronomy, and tourism in various areas[55].

In Brazil, the most common form of oral contamination reported by studies is through the ingestion of acai juice and sugarcane juice[56-58]. Recent cases reported in Brazil of acute CD are related to the consumption of acai juice (the main food mentioned in the present study), considered an essential food in the diet of the population in the Northern region of Brazil and highly appreciated in other states and countries[59,60].

A study reported 19 occurrences of oral CD between 2009 and 2019, distributed among the states of Acre, Amapá, Amazonas, Pará, Maranhão, and Tocantins[61]. The study also revealed that the state with the highest number of cases was Pará, and the main contaminated food

involved was artisanal acai, but there were also records of contamination through the ingestion of bacaba juice[61].

Regarding the wild game meats consumed by the respondents, they are considered intermediate hosts of *T. cruzi:* paca, collared peccary, white-lipped peccary, armadillo, deer, agouti, tapir, capybara, monkey, agouti, and coati[23]. A study revealed that although acquiring CD through the consumption of meat from infected animals is a rare event, it should always be considered as a transmission hypothesis, particularly when other routes are ruled out, since hunting, handling of carcasses, and consumption of wild mammals (reservoirs) are common among rural populations in Brazil and Latin America[62].

CONCLUSION

The research revealed that the majority of the interviewees reported having heard of the vector at some point in their lives, with the main sources of knowledge being educational institutions and media outlets. There was little involvement from healthcare units and professionals in addressing the issue in their daily service.

Regarding transmission and preventive measures, knowledge among the study population is satisfactory for the most part, with over half using mosquito nets/curtains as a preventive measure. However, there was limited understanding of the signs and symptoms of the disease. Less than half of the interviewees correctly identified Triatomines, with *R. montenegrensis* being the most mentioned species as the vector.

Concerning dietary habits, the majority consume fruits considered risky for oral transmission of CD, and there is a relatively high consumption of game meat. Although some aspects were satisfactory, educational efforts need to be intensified to fill gaps and promote disease prevention.

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Conflicts of Interest:

The authors declare no conflict of interest.

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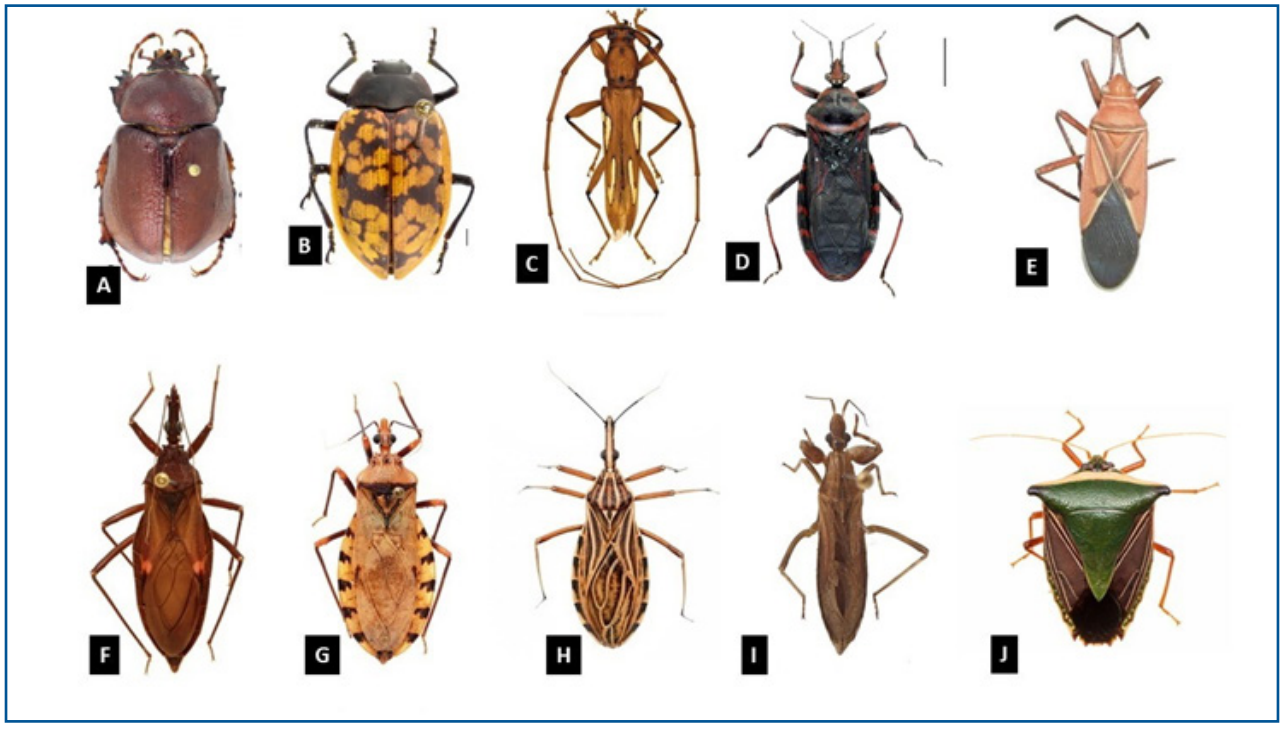
Supplementary Material 1: Examples of insects used for the identification of Triatomines. Photos: Jader Oliveira



Resumo

Introdução: a doença de Chagas (DC) é uma condição infecciosa causada pelo protozoário *Trypanosoma cruzi,* transmitido principalmente por vetores. Compreender a diversidade destes vetores numa região é crucial para a profilaxia da doença, sendo o controlo vetorial a principal medida para reduzir a sua incidência. Portanto, é fundamental aprimorar o conhecimento sobre os triatomíneos para orientar ações de prevenção e promoção, com participação ativa da comunidade.

Objetivo: descrever o conhecimento dos moradores sobre a doença de Chagas e seus vetores em um município da Amazônia Ocidental brasileira.

Métodos: a coleta foi realizada por meio de entrevista com a aplicação de um questionário semiestruturado contendo questões objetivas e subjetivas aos moradores acima de 18 anos em área urbana do município de Guajará – AM em suas residências.

Resultados: dos 400 participantes, 75% referiram ter ouvido falar no Triatomíneo. 65,38% dos indivíduos que encontraram inseto suspeito no domicílio/peridomicílio, referiu ter matado e a maioria não soube dizer o local para onde o inseto deveria ser encaminhado (91,25%). Apenas 40,25% sinalizaram corretamente os triatomíneos, sendo *R. montenegrensis* (22,75%) o mais escolhido. A maioria desconhecia os sinais/sintomas (70,25%), formas de transmissão (52,75%) e medidas preventivas (62,5%) relacionadas a DC. Quanto aos hábitos alimentares: 93% consomem açaí *(Euterpe olerácea*), 88,75% buriti (*Mauritia flexuosa*), 65,5% cana-de-açúcar (*Saccharum officinarum*), 50,5% bacaba (*Oenocarpus bacaba*), 50,25% patoá (*Oenocarpus bataua*) e 75,75% carne de caça.

Conclusão: a pesquisa demonstrou a existência de várias lacunas de conhecimento acerca da temática, neste sentido faz-se necessário a potencialização das ações de educação em saúde.

Palavras-chave: vigilância em saúde pública, educação em saúde, participação da comunidade, Triatominae.