**Community-based strategies for raising awareness and for *in situ* Chagas disease screening at the Consulate General of Bolivia in Barcelona (Catalonia, Spain): outreach versus detection**

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**ABSTRACT**

Introduction: The biomedical and psycho-socio-cultural aspects of Chagas disease (CD) are important factors for patient life and access to treatment. In light of this situation, a multidimensional approach promoting access to diagnosis and treatment is fundamental.

Methodology: The strategies were performed between 2021 and 2022 at the Consulate General of Bolivia in Barcelona and at the Drassanes-Vall d’Hebron Unit of Tropical Medicine and International Health. **Strategy 1:** awareness-raising and derivation activities for screening. **Strategy 2:** *in situ* awareness-raising and screening.

Results: There were 307 participants, of whom 63% were women, 97.4% of Bolivian origin, and 91.8% of them were resident in Barcelona. **Strategy 1:** 204 people were invited for screening, of whom 73 (35.8%) agreed and underwent screening. 14 of them (19.18%) were diagnosed with CD, and 51 received some form of medical treatment. 39 completed their vaccine schedules; 12 were referred to other services; and 21 (28.8%) were treated for other parasitic infections (10.1% strongyloidiasis, 5.5% giardiasis, 5.5% eosinophilia, 4.1% syphilis). **Strategy 2:** 103 people were screened *in situ* for CD, of which 14 (13.54%) were diagnosed with CD. 3 completed their vaccine schedule (2 hepatitis B and 2 MMR), 1 was referred for iron deficiency anemia, and 2 were treated for other parasitic infections (1 strongyloidiasis and 1 chronic untreated Hepatitis C).

Conclusion: The results show that community action is necessary for improving access to diagnosis and treatment. They show the benefits of each strategy, based on specific objectives, and framed in the specific time-space context of the community action.

**KEY WORDS:** Chagas disease, community health, *in situ* screening, community-based action.

**DECLARATION**

**GRAMMAR CHECK**: <https://www.aje.com/grammar-check/>

Introduction

Chagas disease (CD) is an illness caused by the parasite *T. cruzi,* which, as of now, has been detected in 44 countries on 5 continents. One of the greatest challenges from a public health perspective is the low proportion of people who have been diagnosed and treated, which is estimated at less than 10% worldwide. The World Health Organization estimates that in reality there are between six and seven million affected people in the world (Basile et al., 2011; Médicos Sem Fronteiras, 2015; World Health Organization, 2017).

The biomedical, psycho-socio-cultural, and anthropological aspects of CD are important factors that affect the lives of infected people, their family members, and the societies in which they live. Some of the psycho-social factors become significant barriers when it comes to accessing diagnosis and treatment. Fear and various stigmas attached to CD, along with administrative issues, cause substantial difficulties for the migrant population who need access to public healthcare systems (Avaria-Saavedra & Gómez i Prat, 2008; Briceño-León & Galván, 2007; Oliveira Jr., 2005; Uchoa et al., 2002; Velarde-Rodriguez et al., 2009) (4,5,6,7,8).

An integral, multidimensional, multidisciplinary approach is key to confronting all of these issues, promoting access to treatment and diagnosis, and prioritizing the elimination of the psycho-social barriers that characterize CD (Oliveira Jr., 2005; Sanmartino et al., 2012, 2021; Velarde-Rodriguez et al., 2009) (7,8,9,10). In recent years, approaches with informative, educational, and communicative components (IEC) have proven to be crucial for understanding and addressing the Chagas dilemma. These approaches have brought in new perspectives, which have helped build new thought paradigms and methods for handling the situation in a more unified and multidisciplinary way. (Sanmartino et al., 2021)(10).

One of the most successful and transformative initiatives in recent years was the creation of the International Federation of Associations of People Affected by Chagas Disease (FINDECHAGAS), in Olinda, Pernambuco, Brazil. In 2022 there were thirty associations of people affected by CD registered across five continents: Asia, Europe, North America, Oceania, and South America; and in 14 countries: Argentina, Australia, Bolivia, Brazil, Colombia, Ecuador, France, Italy, Japan, Mexico, Spain, Switzerland, United States of America, and Venezuela (11).

One of the main objectives of these associations is collaboration with health systems to improve access to diagnosis and treatment. This is particularly difficult to achieve in areas where CD is unknown, or has not caused significant issues for public health, which is often the case in urban and non-endemic areas. IEC has shown to be fundamental in detecting new cases in areas like this. The community *in situ* screening events were implemented in a way that allowed synergy between peer health educators from the CD-affected associations and healthcare professionals from different institutions (Gómez i Prat et al., 2019, 2020; Ouaarab Essadek et al., 2017; Repetto et al., 2015) (12, 13, 14, 15, 16, 17). The peer educators, some of whom were members of the Association of Friends of People with Chagas Disease (ASAPECHA) in Barcelona, were trained with programs that aim to spread knowledge and awareness of CD (Claveria Guiu et al., 2017) (18).

Within this context, the Public Health and Community team (eSPiC), part of the Drassanes-Vall d’Hebron International Health Unit (USIDVH) of the International Health Program of the Catalan Institute of Health (PROSICS), has worked with ASAPECHA in the community field since 2004. Activities include interventions for improving detection and access to CD diagnosis and treatment, and conducting *in situ* screenings in the community starting in 2014 (12).

This article describes the community strategies implemented to improve access to CD diagnosis and treatment, performed from January 2021 to March 2022 by eSPiC at the Consulate General of Bolivia in Barcelona. At the end, the results of the strategies are compared and evaluated.

Methods

**Intervention Design, Population, and Sample**

The interventions in this study were performed from 2021 to 2022 at the Consulate General of Bolivia in Barcelona and at the Drassanes Tropical Medicine and International Health Unit (UMTSID). The interventions focused largely on participants of Bolivian origin, since there is a high prevalence of CD in this group according to previous European studies [[3](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7360029/#pone.0235466.ref003),[26](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7360029/#pone.0235466.ref026)].

Two different strategies were devised in order to facilitate access to diagnosis and therefore improve the underdiagnosis rate of CD in the Bolivian population resident in Catalonia. Both strategies were designed with the community health agent (ACS) at the core, acting as a bridge between the healthcare system and the community by conducting patient outreach and aiding in the diagnosis-treatment process.

The first strategy (Strategy 1) involved starting weekly awareness and screening referral campaigns at the Bolivian consulate. Those who were interested in being tested for Chagas were given appointments by the community health agents at the UMTSID, where they were also offered the chance to undergo a general preventative screening according to the center’s protocol. In 2021 a total of 33 awareness and referral interventions were performed at the Bolivian consulate (from 19/1/21 to 21/12/21).

In the second strategy (Strategy 2), *in situ* screenings were performed at the consulate. After being informed about Chagas disease by the community health agent, those interested in participating in the screening were attended by healthcare professionals (nurses and doctors) in a designated area at the consulate. Those who tested negative for Chagas were informed over the phone, while those who tested positive were given an appointment at UMTSID and received their diagnosis and treatment plan in person. Once at UMTSID, they were also offered a general preventative screening. Six *in situ* interventions were performed from June 2021 to February 2022.

In both strategies, diagnosis of Chagas was done using two blood tests that detected two different antibodies of *Trypanosoma cruzi,* and a third test if the two initial results were inconclusive. All of the people who tested positive for CD were treated at UMTSID, if they chose to do so.

**Data Collection**

Socio-demographic information about the participants was collected: sex, age, country of origin, place of residence, length of residence in Spain, economic situation, administrative situation, and whether or not they had a health system card. In Strategy 1 this information was collected during an individual interview between the participant and the community health agent at the consulate. In Strategy 2 the interview was conducted over the phone.

From February to April 2022, the medical histories of the participants were revised with prior consent in order to fill in missing information and to include more information related to the CD screening (diagnosis, symptoms, treatment, and monitoring) and the general preventative screening (other healthcare needs that were addressed).

**Statistical Analysis**

A descriptive analysis of the socio-demographic variables of the participants was performed, separated by strategy. The variables were divided by the total number of participants, the total number of screenings, and the total number of people diagnosed with Chagas disease. This allowed for an understanding of the distribution of each variable and exploration of the differences between groups. A random distribution of any missing values in socio-demographic information was assumed which is called missing completely at random, or MCAR, which happens due to difficulties collecting data in phone interviews.

A further descriptive analysis was performed on the results of the Chagas screening and the general preventative screening, also separated by strategy. In order to compare the prevalence rates of CD found with each strategy, both the raw and adjusted prevalence rate ratios were calculated for both groups (with confidence intervals of 95%) through Poisson regression models with robust variance, using generalized linear models and adjusting for age and sex1,2.

**Ethical Considerations**

The Ethics Committee for Medicinal Research at the Vall d’Hebron Research Hospital, which includes the Investigative Projects Commission, met for their regular meeting no 478 on 05/03/2021 and evaluated the relevant amendment 1, from the research project number PR(AG)371/2019 entitled “Community Interventions for *In Situ* Screening for Chagas Disease in the City of Barcelona”, led by primary researcher Dr. Jordi Gómez i Prat.

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The result of the evaluation was the following: Approved

All participants gave verbal consent to participate in the interventions and were actively enrolled in the community interventions once they were informed about the activity. All patients who were screened gave verbal consent to undergo the screening test as part of the health center’s routine screening protocol for CD. Each patient’s consent was documented in their computerized medical history. All procedures during the screenings were performed following World Health Organization guidelines. Upon completion of all activities, a retrospective comparative analysis of the collected data was performed. It was not possible to obtain more data once the activities were completed and data analysis was in progress due to difficulties in contacting the participants. All patient data was codified and analyzed anonymously. No data containing personal or identifying information from the participants has been published. The Vall d’Hebron Hospital Ethics Committee approved the study as a report of the results derived from regular clinical practice.

Results

**Socio-Demographic Characteristics of Participants**

The socio-demographic characteristics of those who participated in the screening are shown in Table 1. Out of 307 total participants, the majority were women (63.5%), of Bolivian origin (97.4%), and residents of Barcelona (91.8%). There was a homogenous distribution across age groups, with the 40-to 49-year-old group constituting the majority at 32.9%, almost a third of all participants. Most participants had stable employment (68.4%); had arrived in Spain five or more years ago (73.3%); and had a Spanish national identity document (87.8%) and a public health system registration card (97%) at the time of the intervention.

**Table 1.** Socio-demographic characteristics of participants

|  | **Total** |  | **Strategy 1 (people reached)** | **Strategy 1 (people screened)** | p1 | **Strategy 2**  **(*in* *situ* screening)** | p2 | p3 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **N= 307** |  | **N= 204** | **N= 73** | **N= 103** |
| **n (%)** |  | **n (%)** | **n (%)** | **n (%)** |
| **Gender** |  |  |  |  |  |  |  |  |
| Female | 195 (63.5%) |  | 135 (66.2%) | 50 (68.5%) | 0.60 | 60 (58.3%) | 0.17 | 0.17 |
| **Age** |  |  |  |  | 0.40 |  | 0.089 | 0.73 |
| 19 and under | 22 ( 7.2%) |  | 20 ( 9.8%) | 4 ( 5.5%) |  | 2 ( 1.9%) |  |  |
| 20-29 | 37 (12.1%) |  | 24 (11.8%) | 10 (13.7%) |  | 13 (12.6%) |  |  |
| 30-39 | 74 (24.1%) |  | 51 (25.0%) | 18 (24.7%) |  | 23 (22.3%) |  |  |
| 40-49 | 101 (32.9%) |  | 66 (32.4%) | 22 (30.1%) |  | 35 (34.0%) |  |  |
| 50 and over | 73 (23.8%) |  | 43 (21.1%) | 19 (26.0%) |  | 30 (29.1%) |  |  |
| **Country of origin\*** |  |  |  |  | 1.00 |  | 1.00 | 1.00 |
| Bolivia | 299 (97.4%) |  | 199 (97.5%) | 71 (97.3%) |  | 100 (97.1%) |  |  |
| Other | 8 ( 2.6%) |  | 5 ( 2.5%) | 2 ( 2.7%) |  | 3 ( 2.9%) |  |  |
| **Place of residence\*** |  |  |  |  | 1.00 |  | **<0.001** | **0.007** |
| Barcelona | 247 (91.8%) |  | 161 (97.0%) | 53 (98.1%) |  | 86 (83.5%) |  |  |
| Other provinces | 22 ( 8.2%) |  | 5 ( 3.0%) | 1 ( 1.9%) |  | 17 (16.5%) |  |  |
| **Years since arriving in Europe** |  |  |  |  | 0.92 |  | 0.24 | 0.31 |
| Less than 3 years | 26 ( 9.3%) |  | 16 ( 8.0%) | 5 ( 7%) |  | 10 (13%) |  |  |
| Between 3 and 5 years | 49 (17.4%) |  | 39 (19.4%) | 14 (19%) |  | 10 (13%) |  |  |
| 5 or more years | 206 (73.3%) |  | 146 (72.6%) | 53 (74%) |  | 60 (75%) |  |  |
| **Economic situation** |  |  |  |  | 0.84 |  | 0.052 | 0.22 |
| Stable employment | 188 (68.4%) |  | 140 (69.7%) | 49 (67%) |  | 48 (64.9%) |  |  |
| Unstable employment | 20 ( 7.3%) |  | 10 ( 5.0%) | 4 ( 5%) |  | 10 (13.5%) |  |  |
| Unemployed | 67 (24.4%) |  | 51 (25.4%) | 20 (27%) |  | 16 (21.6%) |  |  |
| **Administrative situation** |  |  |  |  | 0.69 |  | **0.046** | 0.29 |
| National identity document/foreigner identity number | 244 (87.8%) |  | 183 (90.1%) | 65 (89%) |  | 61 (81.3%) |  |  |
| Passport | 34 (12.2%) |  | 20 ( 9.9%) | 8 (11%) |  | 14 (18.7%) |  |  |
| **Public healthcare registration card\*** | 292 (97.0%) |  | 201 (98.5%) | 71 (97%) | 0.26 | 91 (93.8%) | **0.025** | 0.19 |
| P- value 1: socio-demographic differences between people screened and people not screened (strategy 1).  P-value 2: differences between people who participated in strategy 1 and strategy 2.  P-value 3: differences between people screened in strategy 1 and strategy 2.  P-values calculated with Chi-squared test except for the variables "Country of Origin", "Place of Residence", and "Public Healthcare Registration Card", which were calculated using Fisher’s exact test.  For the variables "Place of Residence", "Years Since Arriving in Europe", "Economic Situation", and "Administrative Situation" the percentage of missing values was between 8 and 10%. | | | | | | | | |

In the first strategy, with the objective of awareness and outreach, no significant differences in socio-demographic characteristics were observed between those who agreed to be screened and those who declined.

In general, the socio-demographic characteristics were similar among the participants in both strategies. However, significant differences were observed in the variables “Place of Residence”, “Administrative Situation”, and “Public Healthcare Registration Card”. In Strategy 2, the percentage of people who did not reside in Barcelona was 3.0%, while in Strategy 1 it was 16.5%. With regard to administrative situations, 9.9% of participants reported having a passport in Strategy 1, while 18.7% reported having a passport in Strategy 2. In Strategy 1, 98.5% of people reported having a public healthcare registration card, while 93.8% had one in Strategy 2. The characteristics of participants who agreed to undergo screening were similar in both groups except place of residence; 1.9% of Strategy 1 participants lived outside of Barcelona, while 16.5% of Strategy 2 participants lived outside of Barcelona.

**Results of the Chagas Screening (*In Situ* or at UMTSID)**

<https://app.diagrams.net/#G1Xkr_Q1nIBi0GtDeHXiltPoL_0h1c2roy>

The first part of Figure 1 describes salient results of Chagas screenings in both strategies.

Out of 204 people invited for screening in Strategy 1, 73 were screened at UMTSID (35.8%) (2.1 people per intervention performed). Among those screened, 14 people were diagnosed with CD (19.8% (IC95%: 10.10-28.24)). 9 of them were diagnosed for the first time. The majority of those diagnosed did not present Chagas-related symptoms; only one person showed cardiac symptoms. Of the 14 people diagnosed with CD, 13 began a periodic monitoring plan after the intervention. 5 of those people had been previously diagnosed but hadn’t received treatment prior to this screening.

Of the 103 people who were screened for CD *in situ* during Strategy 2 (17.17 people per intervention performed), 14 were diagnosed (13.54% (IC95%: 10.10-28.24)). 9 of them were diagnosed for the first time. All of them were asymptomatic, although 10 of those patients did not have relevant CD-symptom test results when their medical history was taken. 3 people received a full course of treatment, 2 of which were done after the screening. 5 people began periodic monitoring once they were diagnosed, and one of those people decided to start a previous treatment plan over again.

No significant differences in the prevalence rate of Chagas diagnosis was found between the people screened in both strategies (Table 2).

The socio-demographic characteristics of the people who were diagnosed with CD are shown in Table 3. Half were women, largely in the 50-and-over age group (46%) and residents of Barcelona (96%). The majority had stable employment (83%), had arrived in Spain five or more years before (84%), and had a Spanish national identity document (92%). All were of Bolivian origin and had a public healthcare system registration card at the time of intervention. No significant differences were observed in any of the socio-demographic characteristics between the people diagnosed with Chagas in Strategy 1 and those diagnosed in Strategy 2.

**Figure 1. Primary results of both strategies**

Diagrama

Descripción generada automáticamente

| **Strategy 1:**  33 interventions | **Strategy 2:**  6 interventions |
| --- | --- |
| 204 people from the consulate agreed to participate  (135 ♀, 69 ♂️) | 103 people from the consulate agreed to participate (135 ♀, 69 ♂️) |
| 73 go to UMTSID  (35%) (50 ♀, 23 ♂️) |  |
| CD screening & general screening at UMTSID | CD screening *in situ* at consulate |
| 73 people underwent CD screening at UMTSID  (2.21 people per intervention) ((50 ♀, 23 ♂️) | 103 people underwent CD screening *in situ*  (17.17 people per intervention) (60 ♀, 43 ♂️) |
| 14 people diagnosed with Chagas  19.18%, IC95%:(10.10-28.24) (7 ♀, 7 ♂️)   * 9 people with new diagnoses * 13 people treated   + 8 began treatment   + 8 finished treatment     - 5 stopped treatment due to side affects * 13 people under periodic monitoring   + 5 restarted previous treatment | 14 people diagnosed with Chagas  13.59%, IC95%:(10.10-28.24) (7 ♀, 7 ♂️)   * 9 people with new diagnoses * 3 people treated   + 2 began treatment   + 3 finished treatment * 5 people under periodic monitoring   + 1 re-started previous treatment |
| 73 people underwent general screening at UMTSID  (2.21 people per intervention) (50 ♀, 23 ♂️) | 4 people underwent general screening at UMTSID  (0.67 people per intervention) (1 ♀, 3 ♂️) |
| 51 people needed medical attention   * 33 people finished vaccine schedule * 32 people given other diagnoses   + 21 people with infections/parasites (UMTSID)   + 10 people referred to other services | 4 people needed medical attention   * 3 people finished vaccine schedule * 3 people given other diagnoses   + 2 people with infections/parasites (UMTSID)   + 1 person referred to other services |

| **IN YELLOW: Interventions at the Bolivian Consulate in Barcelona** |
| --- |
| **IN BLUE: Interventions at the Tropical Medicine and International Health Unit at Drassanes-Vall d’Hebron (UMTSID)** |

| **Table 2.** Comparison of prevalence rates of positive Chagas diagnosis among total screened participants by strategy | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Total** | |  |  | **Strategy 1** | | **Strategy 2** | |  |  |  |
|  |  | **N= 307** | |  |  | **N= 73** | | **N= 103** | | **RP (IC95%)** | | **p** |
|  |  | **% (IC95)** | |  |  | **% (IC95)** | | **% (IC95)** | |
| **Chagas prevalence rate** |  |  | **15.91** | (10.50 - 21.31) |  |  | **19.18** | (10.1- 28.24) | **13.59** | (6.96 - 20.23) | 0.709 | (0.359 - 1.398) | 0.321 |
| **Adjusted Chagas prevalence rate\*** |  |  | 15.91 | (10.60 - 21.22) |  |  | **20.14** | (10.64 - 29.64) | **13.15** | (6.88 - 19.42) | 0.653 | (0.333 - 1.280) | 0.215 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PR: prevalence ratio. IC95%: Confidence interval of 95%. p: p-value. \*Prevalence rate adjusted for age, sex, robust Poisson regression model | | | | | | | | | | | | | |

| **Table 3.** Characteristics of people diagnosed with Chagas disease | | | | |
| --- | --- | --- | --- | --- |
|  | **Total** | **Strategy 1** | **Strategy 2** | **p** |
|  | **N=28** | **N=14** | **N= 14** |  |
| **n (%)** | **n (%)** | **n (%)** |  |
| Socio-demographic characteristics |  |  |  |  |
| **Gender** |  |  |  | 1.00 a |
| Female | 14 (50%) | 7 (50%) | 7 (50%) |  |
| **Age** |  |  |  |  |
| 20-29 | 1 ( 4%) | 0 ( 0%) | 1 ( 7%) | 0.71a |
| 30-39 | 7 (25%) | 4 (29%) | 3 (21%) |  |
| 40-49 | 7 (25%) | 4 (29%) | 3 (21%) |  |
| 50 and over | 13 (46%) | 6 (43%) | 7 (50%) |  |
| **Country of origin** |  |  |  |  |
| Bolivia | 28 (100%) | 14 (100%) | 14 (100%) |  |
| **Place of residence** |  |  |  |  |
| Barcelona | 25 (96%) | 12 (100%) | 13 (93%) | 0.35 |
| Other provinces | 1 ( 4%) | 0 ( 0%) | 1 ( 7%) |  |
| **Years from arrival in Europe** |  |  |  |  |
| Less than 3 years | 1 ( 4%) | 0 ( 0%) | 1 ( 9%) | 0.15b |
| 3 to 5 years | 3 (12%) | 3 (21%) | 0 ( 0%) |  |
| 5 or more years | 21 (84%) | 11 (79%) | 10 (91%) |  |
| **Economic situation** |  |  |  |  |
| Stable employment | 20 (83%) | 13 (93%) | 7 (70%) | 0.071b |
| Unstable employment | 1 ( 4%) | 1 ( 7%) | 0 ( 0%) |  |
| Unemployed | 3 (13%) | 0 ( 0%) | 3 (30%) |  |
| **Administrative situation** |  |  |  |  |
| Spanish national identity document/foreigner identity number | 22 (92%) | 13 (93%) | 9 (90%) | 0.80b |
| Passport | 2 ( 8%) | 1 ( 7%) | 1 (10%) |  |
| **Public healthcare system registration card** | 27 (100%) | 14 (100%) | 13 (100%) |  |
|  |  |  |  |  |
| \*: dichotomous variable (yes/no). p: p-value. a: contrast statistics calculated with Chi-squared test. b: contrast statistics calculated with Fisher’s exact test | | | | |

**Results of general preventative screening at UMTSID**

The second part of Figure 1 describes the primary results from the general preventative screening carried out at UMTSID in both strategies.

In Strategy 1, all participants that chose to be screened for Chagas disease (73 total) underwent the preventative screening at the same time. Of those 73, 51 people required and requested some type of medical attention for issues not related to Chagas. 39 of those people completed their vaccine schedule; in total they received 34 doses of the hepatitis B vaccine, 15 of the MMR vaccine, 3 chickenpox vaccines, 2 tetanus-diphtheria vaccines, 2 hepatitis A vaccines, 1 SARS-Cov-2 vaccine, and 1 meningitis vaccine. 12 people were referred to other services (10 to their general practitioners and 1 to transcultural psychiatry). Of the 73 people who underwent preventative screening, 21 people (28.8%) were treated at UMTSID for parasite infection. The most frequent cases were of strongyloidiasis (8/73; 10.1%), giardiasis (4/73; 5.5%), eosinophilia (4/73; 5.5%), and syphilis (3/73; 4.1%).

In general for Strategy 2, participants agreed to the general preventative screening at UMTSID if they tested positive for Chagas. In total, 4 underwent general screening. 3 completed their vaccine schedule (2 hepatitis B and 2 MMR). 3 required further treatment due to the results of the general screening; 1 was referred to their general practitioner, and 2 were treated at UMTSID for infections/parasites (1 strongyloidiasis and 1 chronic untreated Hepatitis C).

Discussion

The results obtained in this study highlight the strengths, advantages, and disadvantages of both strategies and emphasize the importance of addressing Chagas from a community perspective.

The prevalence rates of CD observed in the screenings through both the outreach and *in situ* strategies were 19.18% (IC95%: 10.10-28.24) and 13.59% respectively. These rates are similar to those reported in previous studies; the Catalan Blood Bank found a *T. cruzi* seroprevalence infection rate of 10.2% in Bolivian donors [31]. In Spain a prevalence rate of 27.7% was found in the Bolivian population, and across Europe the prevalence rate of CD was found to be 18.1% (IC95%: 13.9-22.7%) in residents of Bolivian origin [26].

Due to the nature of this study, it is important to understand before analysis that it is not possible to carry out a quantitative statistical comparison of the effectiveness and efficiency of each strategy. It is also not possible to accurately compare the prevalence rates obtained in each strategy. This is because: 1) There is no comparable denominator for both strategies. The number of people invited to participate in each strategy is unknown, which means it is impossible to know the initial acceptance rate of each individual intervention. 2) The sample size is very small. 3) A sizeable quantity of socio-demographic information was missing from the phone interviews, and it was not possible to contact those with missing information afterward.

Similarly, the number of people invited to participate in the IEC strategy is unknown, and therefore it is also impossible to calculate an acceptance rate for those interventions. Prior evidence may suggest that strategies designed for knowledge exchange for CD awareness and prevention have lower acceptance rates than strategies in which the IEC intervention also includes an *in situ* diagnostic test (Plos). This is due to the many psycho-socio-cultural barriers, such as fear and stigma, that come with Chagas (Avaria-Saavedra & Gómez i Prat, 2008).

During the outreach strategy, all participants who attended the health center for Chagas screening also agreed to undergo a general preventative screening, and in 51 cases those people were treated for reasons unrelated to CD. The fact that those who agreed to be screened did, in fact, attend their appointments at the health center shows an improvement in those patients’ relationships with the healthcare system due to the involvement of the community health agent. This improvement could increase the detection of other treatment needs, which in the case of this study happened during the visit to UMTSID and the general preventative screening.

Finally, this strategy requires less mobilization of healthcare resources into the community sphere, since the intervention at the consulate depends solely on community health agents while equipment and healthcare personnel remain at UMTSID.

In the *in situ* strategy, there was a higher percentage of participants who did not reside in the province of Barcelona. The *in situ* screening strategies, when compared to the outreach strategies, could have a greater geographic impact–they are less centralized, which helps to overcome geographic barriers to healthcare access. There was also a higher number of people with passports, but a lower number of people without public healthcare registration cards.

The characteristics of the *in situ* screenings work to remove access barriers that certain migrant populations have when they have no prior relationship with the healthcare system (reference). Evidence from previous studies shows that *in situ* screening interventions increase the likelihood that people will agree to participate in the screening (X), while participant loss is more frequent in outreach strategies (X).

In relation to elements common to both strategies: among the participants there is a greater percentage of women than men. Other publications also showed this gender discrepancy when it comes to showing interest in participating in awareness and screening events related to CD [24, 27, 28]. According to these previous studies, fear of death and knowledge of congenital CD transmission drives women to show more concern and interest in screening. They feel guilt, worry, and responsibility for potential transmission of the disease to their children [5]. In addition, women make up a greater proportion of the Bolivian migrant population to Catalonia in recent decades, se ha caracterizado por…(ref).

Both strategies have made it clear that there are advantages to combining a vertical strategy, especially directed at CD, with other general healthcare interventions. Both strategies detected other healthcare needs among those who underwent the general preventative screening, mainly diagnosing infections and parasites (largely strongyloidiasis, 10.1% of cases), although there were also cases in other medical areas that were referred to general practitioners and, in one case, psychiatry. This is consistent with findings in other studies. In general… In a study by Salvador et al (2020 - REFA) researchers found between 5.5% and 26.8% prevalence rate in different cities, specifically 14% in Latin Americans. Another study done in Barcelona (REFC) found a prevalence rate of 16% in the Bolivian population; another in Alicante found a 12% prevalence rate in the Bolivian population (REFB).

Offering a Chagas screening at the same time as screenings for other tropical diseases fits within the ethos of UMTSID and the logic of systematically integrating opportunities that arise within the community. “In light of the pandemic, the idea of a community-based approach to CD and COVID-19 arose as an opportunity of systematic integration (OSI). The term “community-based” refers to a philosophical approach in which communities play an active role, highlighting and addressing the issues they identify as important to them. Communities are notably encouraged to actively design, develop, and deliver their own prevention and intervention strategies, which challenges community members to identify what the issues are and work together to address those issues [32]. OSI are strategies developed in order to face the challenges of co-infection and co-morbidity between diseases. Worldwide, they have progressively been implemented since 2007 and have shown positive outcomes with different diseases.

Among notable OSI examples there is the following: diagnosis of haemoparasites infection (Plasmodium spp., filariasis spp. and T. cruzi) through malaria films [33, 34]; screening of the Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Syphilis and CD at birth [35]; screening of opportunistic infections that define the AIDS condition [36, 37]; dual epidemiology approach (with communicable and noncommunicable diseases) in the screening of chronic diseases that can cause chronic cardiomyopathy (CD, rheumatic heart disease, hypertension, diabetes, cardiorenal syndrome…)”

Conclusion

The design and execution of community-based public health strategies in non-endemic areas should be adapted to each different context, keeping in mind overall objectives and the level of vulnerability of the people within that context. A community healthcare intervention that involves health centers and teams with community health agents and peer educators may be more effective than typical health center work if it is designed to address the many psycho-emotional and socio-anthropological factors tied to CD. Provided that community health teams are experts in working with these factors and have access to the resources necessary for a multidimensional approach, they can be successful. Focusing on interventions like these allows for bonds of trust to form between healthcare professionals and the community, which is key for the success of strategies that promote healthcare.

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