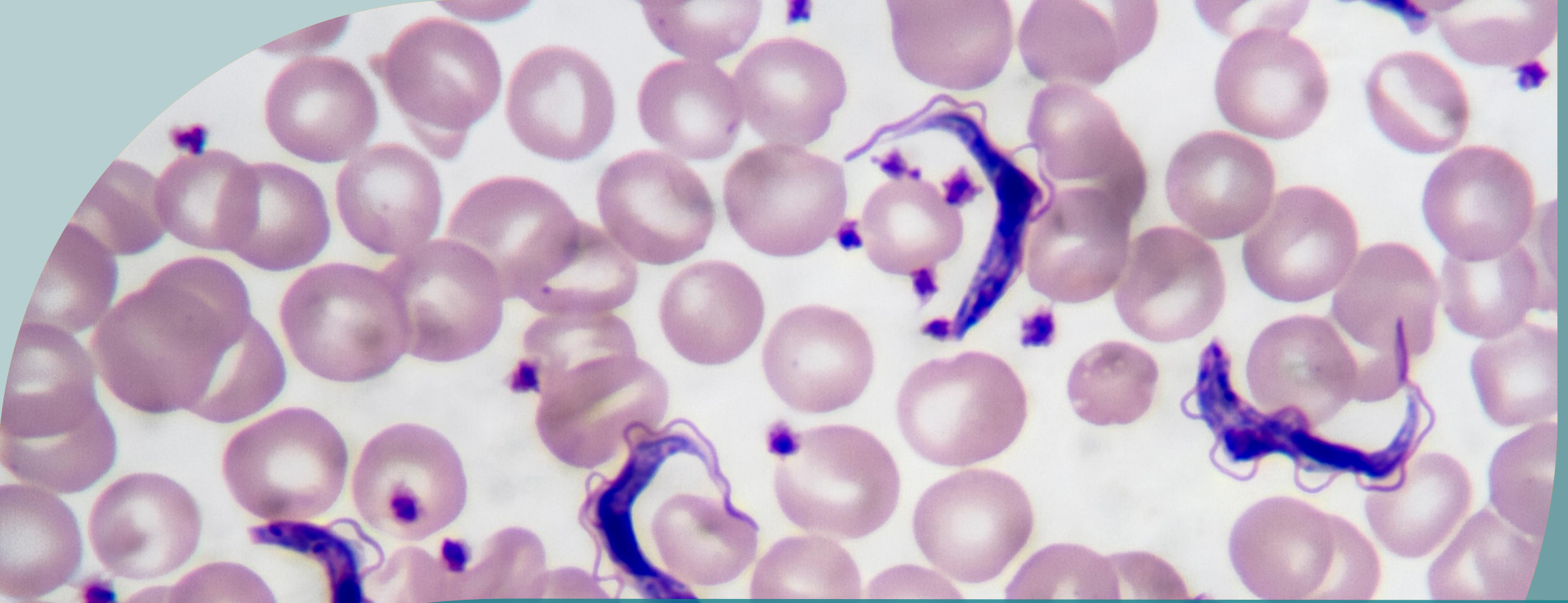
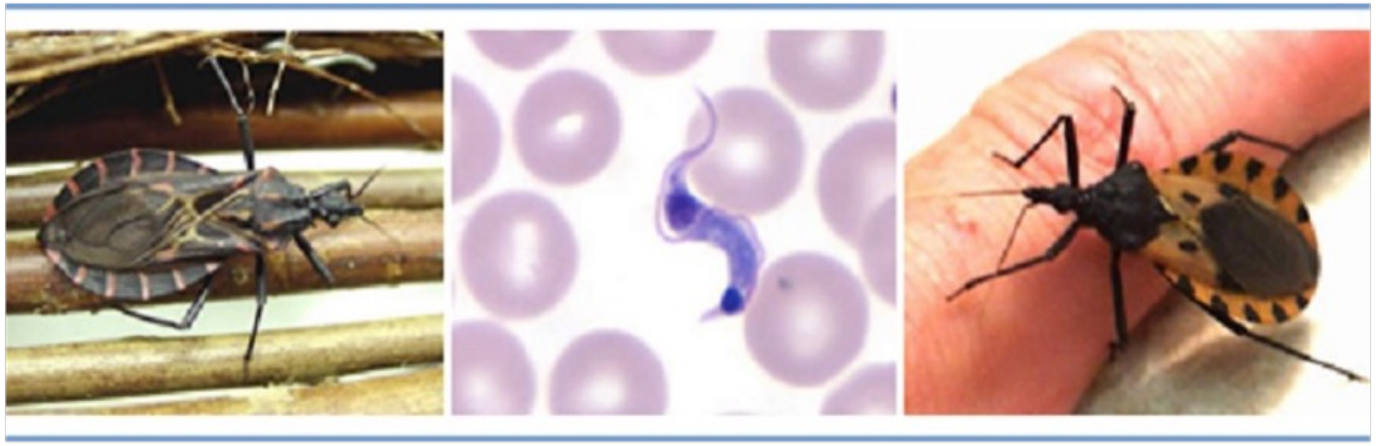


# Chagas disease in the United States

Paula Stigler Granados, PhD, MS

World Chagas Day 2023, San Diego, CA

SDSU
College of Health and Human Services
School of Public Health



# Chagas Disease

Transmitted by the triatomine vector

Caused by the parasite *Trypanosoma cruzi (T. cruzi)*

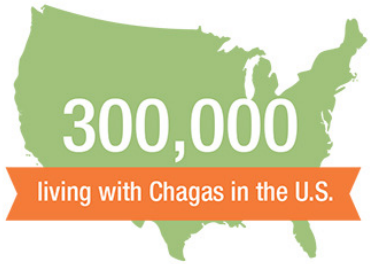
Endemic in the Americas

Scientists have recovered *T. cruzi* in 9000 years old mummies

# CHAGAS DISEASE

**Chagas disease is caused by** the parasite *Trypanosoma cruzi* and is spread by infected triatomine bugs. It can cause **serious heart and gastrointestinal problems.**


**The parasite that causes Chagas disease is found only in the Americas**, where an estimated 7 million people are infected.[1] In the United States, more than 300,000 people are living with the disease.[2]

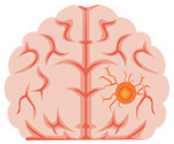


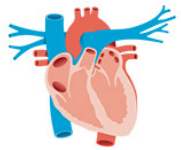

**Chagas disease causes approximately**

**10,000 deaths per year globally.**[3]

Up to **30%** of infected people **develop symptoms.**

**Chagas disease can cause**


stroke


heart attack

sudden death

Chagas disease accounts for at least

**$627 million in global healthcare-related costs annually.**[4]

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

**For more information on Chagas**
**www.cdc.gov/parasites/chagas**

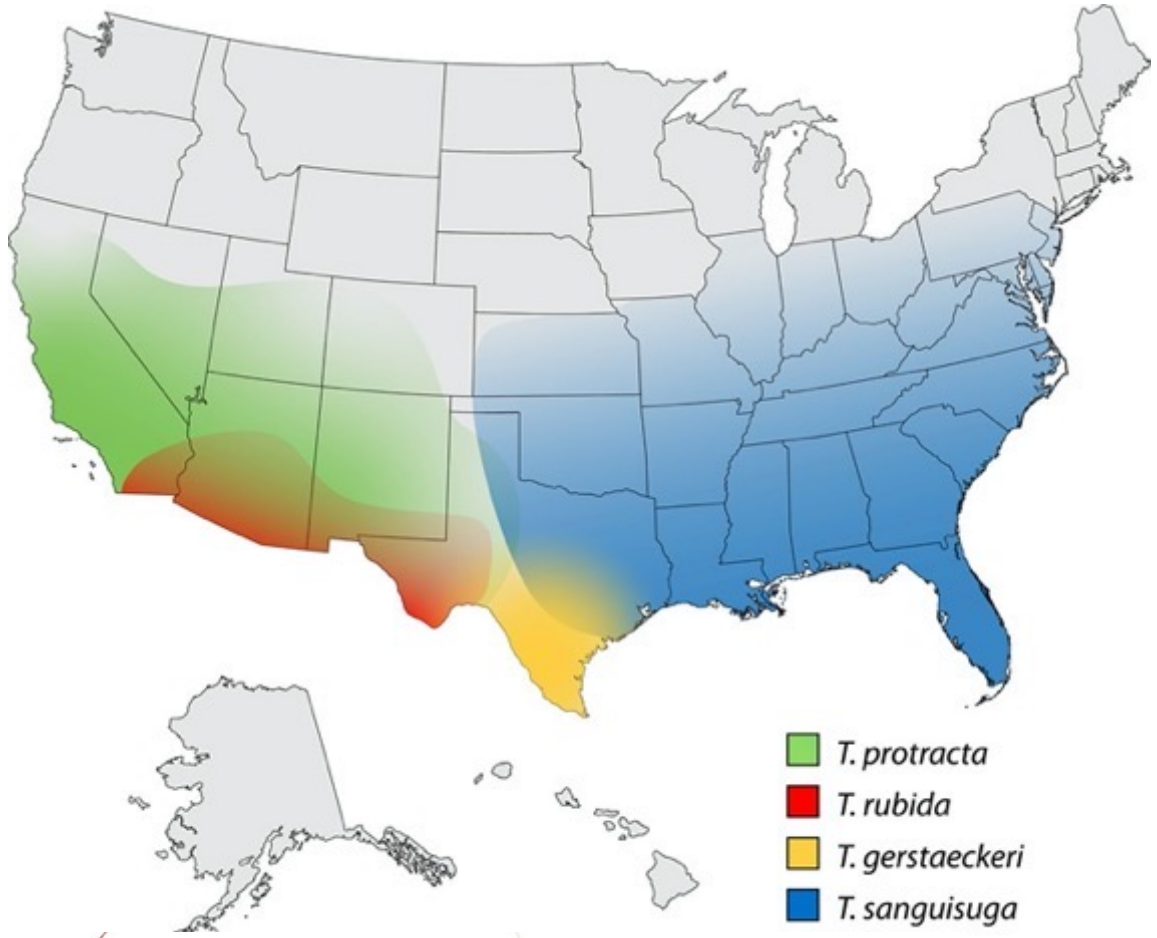
1. http://www.who.int/mediacentre/factsheets/fs340/en/ 2. https://www.researchgate.net/publication/26703028_An_Estimate_of_the_Burden_of_Chagas_Disease_in_the_United_States
3. http://www.who.int/chagas/epidemiology/en/ 4. https://www.ncbi.nlm.nih.gov/pubmed/23395248

CS272948-BU

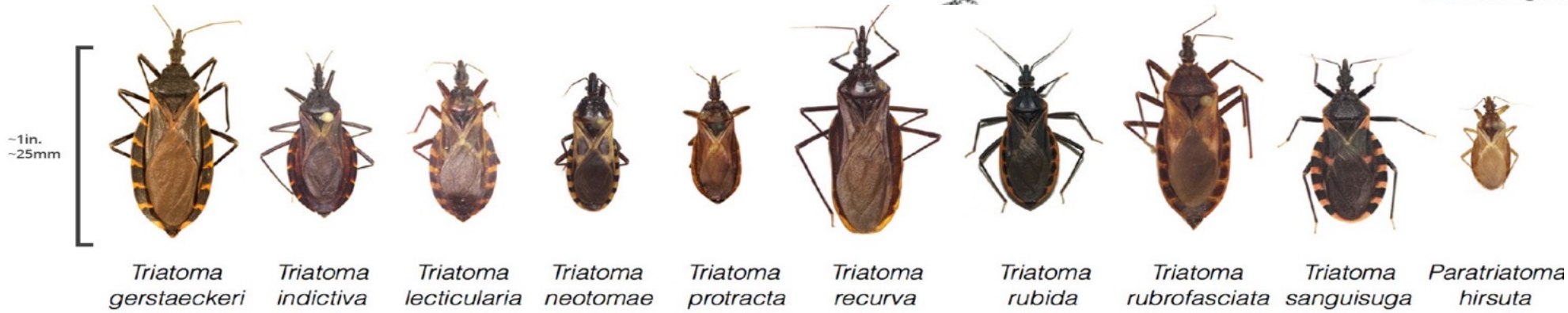
# Transmission

| |
|---|
| Vector |
| Congenital |
| Oral |
| Blood transfusion or organ transplant |
| Accidental (Laboratory) |

# Variety of Species in the U.S.




Bern, C., Messenger, L. A., Whitman, J. D., & Maguire, J. H. (2019). Chagas disease in the United States: a public health approach. *Clinical microbiology reviews*, *33*(1).



# Human Prevalence of Chagas Disease in the U.S.

# Estimated Prevalence of Chagas Disease in the U.S.

**287,711**

**Estimates of the number of Latin America–born adults with Chagas disease in the United States**

**57,027**

**Estimated Latin America–born persons with Chagas cardiomyopathy in the United States**

**108**

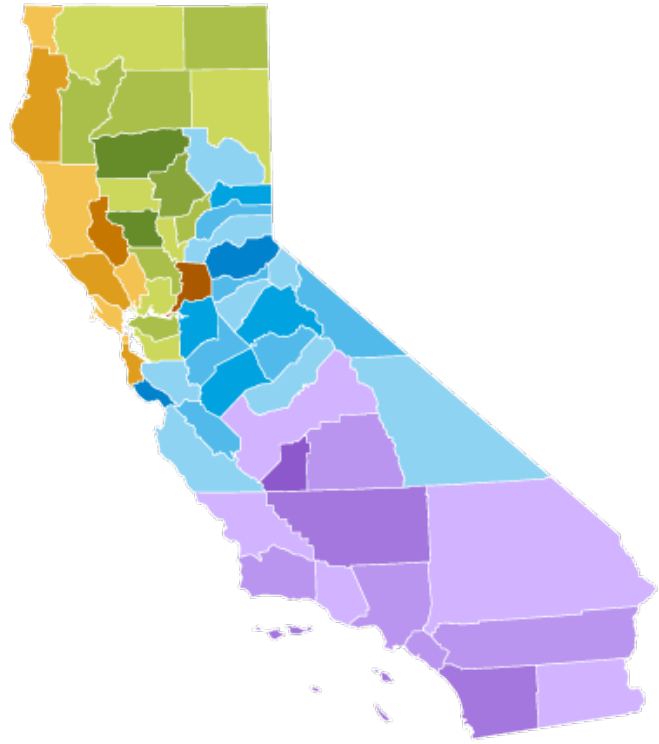
**Estimated annual births to *Trypanosoma cruzi*–infected women (estimated 43, 283) and congenital infections, United States**

Irish, A., Whitman, J. D., Clark, E. H., Marcus, R., & Bern, C. (2022). Updated estimates and mapping for prevalence of Chagas disease among adults, United States. *Emerging infectious diseases*, *28*(7), 1313

# Chagas Disease in CA

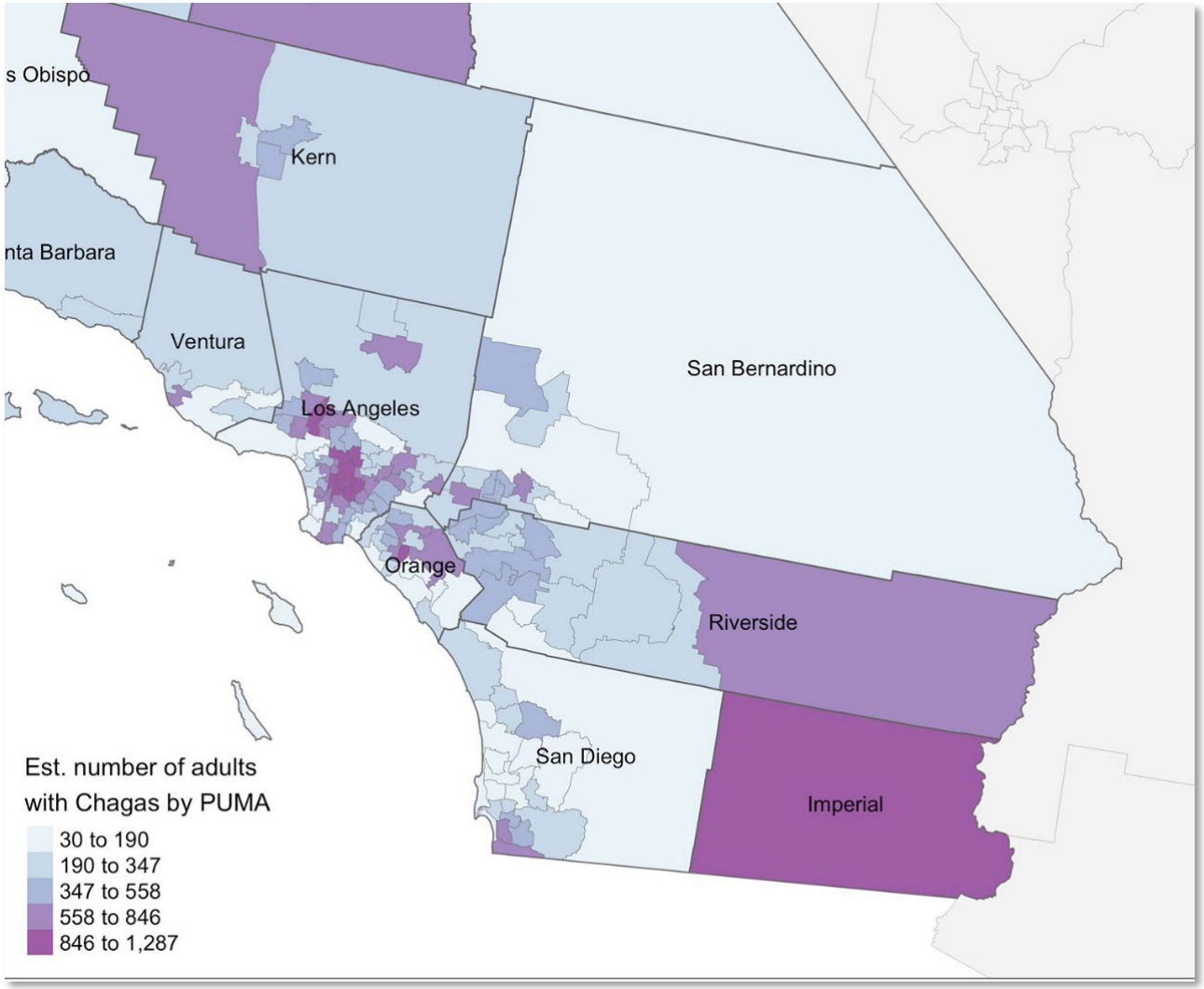
- California has the most people with Chagas disease of any state,
- Estimated 70-100,000. people with Chagas Disease
- Triatomines are native to California and have been found infected

- Estimated nearly 45,000 infected persons live in the Los Angeles metro area, -highest burden of any metropolitan area in the United States.
- Includes an estimated 9,400 cardiomyopathy patients and 266 yearly births to infected women.



*Sources: https://chagasus.org/chagas-disease-in-california/*

# Map of the Southern California area, showing estimated numbers of adults with Chagas disease. PUMA, Public Use Micro-Area.




*Source:* Irish A, Whitman JD, Clark EH, et al. Updated Estimates and Mapping for Prevalence of Chagas Disease among Adults, United States. *Emerging Infectious Diseases*. 2022;28(7):1313-1320. doi:10.3201/eid2807.212221./

# Prevalence of T. cruzi infection among triatomines per county in CA

| County | No. of specimens collected | No. of specimens analyzed | No. (%) Positive for *T. cruzi* infection | References |
|---|---|---|---|---|
| Kern | 1 | 1 | 1 (100) | [13] |
| Tulare | 2 | 2 | 2 (100) | [14,15] |
| Calaveras | 44 | 44 | 29 (65.9) | [16,17,18] |
| Madera | 125 | 77 | 39 (50.6) | [14,19,20] |
| Butte | 4 | 4 | 2 (50) | [13] |
| Los Angeles | 2,005 | 1,679 | 576 (34.3) | [13,17,19,20,21,22,23,25,26] |
| San Diego | 1,027 | 477 | 157 (32.0) | [6,21,27] |
| Fresno | 4 | 4 | 1 (25) | [27] |
| San Benito | 9 | 9 | 2 (22.2) | [28] |
| Riverside | 18 | 18 | 4 (22.2) | [29] |
| Stanislaus | 6 | 6 | 1 (16.7) | [14] |
| San Bernardino | 398 | 355 | 54 (15.21) | [30] |

https://doi.org/10.1371/journal.pntd.0009035.t002

Valdez-Tah A, Ibarra-Cerdeña CN (2021) Call to action: A literature review of Chagas disease risk in California 1916–2018. PLOS Neglected Tropical Diseases 15(2): e0009035. https://doi.org/10.1371/journal.pntd.0009035
https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009035

# Chagas Disease in Texas –where its reportable

Became a reportable disease in 2013

203 cases* reported between 2013 and 2020

- 19 cases in 2013
- 20 cases in 2014
- 25 cases in 2015
- 27 cases in 2016
- 33 cases in 2017
- 32 cases in 2018
- 28 cases in 2019
- 47 Cases in 2020

Acquisition of all cases:

18% local (n=37)

51% imported (n=104)

31% unknown (n=62)

https://www.dshs.texas.gov/idcu/disease/chagas/data/

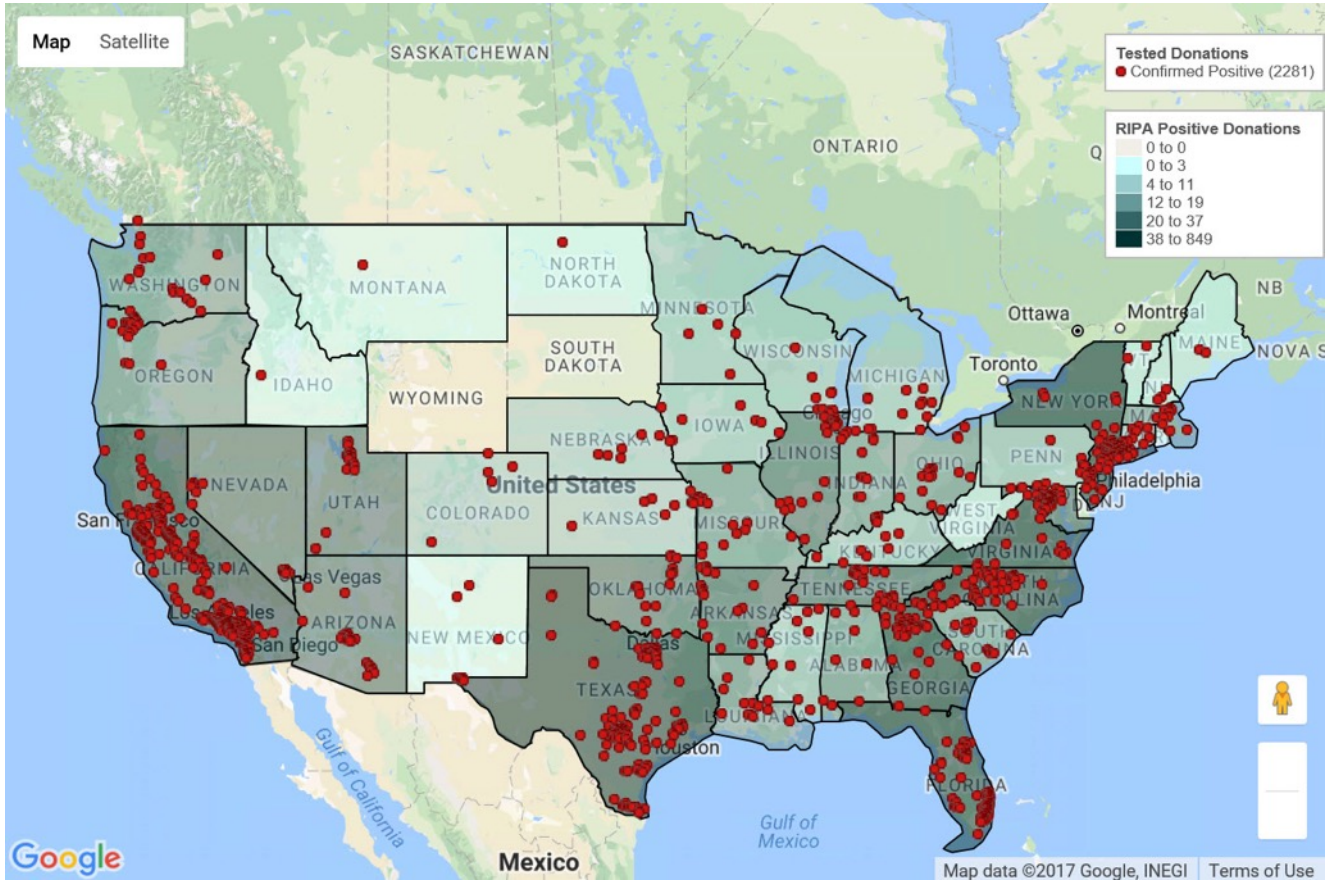
Approx. 3.2 million people born in Latin America living in Texas (2019)

*Sources:* Migration Policy Institute tabulations of the U.S. Census Bureau American Community Survey (ACS) and Decennial Census.

*3 Acute, 153 Chronic Indeterminate and 47 Chronic Symptomatic Cases

# Most common method for diagnosing Chagas in the U.S.:

# BLOOD DONATIONS




# Do health care providers know what to do with a positive donation result?

# Animal Prevalence in the U.S.

First found in dogs in the U.S. in 1972.

Role of domestic dogs in the *T. cruzi* transmission cycle in the U.S. is not completely understood.

Places like Texas reported seroprevalence in dogs ranging from 3.6 to 57.6%.

*T. cruzi* infection has been reported in more than 27 species of mammals in the U.S.

IT ONLY TAKES
ONE BITE

Meyers, A. C., Purnell, J. C., Ellis, M. M., Auckland, L. D., Meinders, M., & Hamer, S. A. (2020). Nationwide exposure of US working dogs to the Chagas disease parasite, Trypanosoma cruzi. *The American journal of tropical medicine and hygiene*, *102*(5), 1078.

## Vida Pharmacal National Summary

| | Total Dogs Tested | | # Positive Dogs | | Prevalence |
|---|---|---|---|---|---|
| Total Enrolled &Tested Dogs | 849 | | 152 | | 17.9% |
| Practices Testing all Dogs | 389 | | 43 | | 11.1% |
| Practices Testing Only Symptomatic Dogs | 460 | | 109 | | 23.7% |

### Texas *T cruzi* prevalence

| | |
|---|---|
| Shelter dogs: | **18%** |
| Military Working Dogs: | **8%** |
| Private Kennels/Hunting operation: | **58%** |
| Companion animals San Antonio: | **13%** |

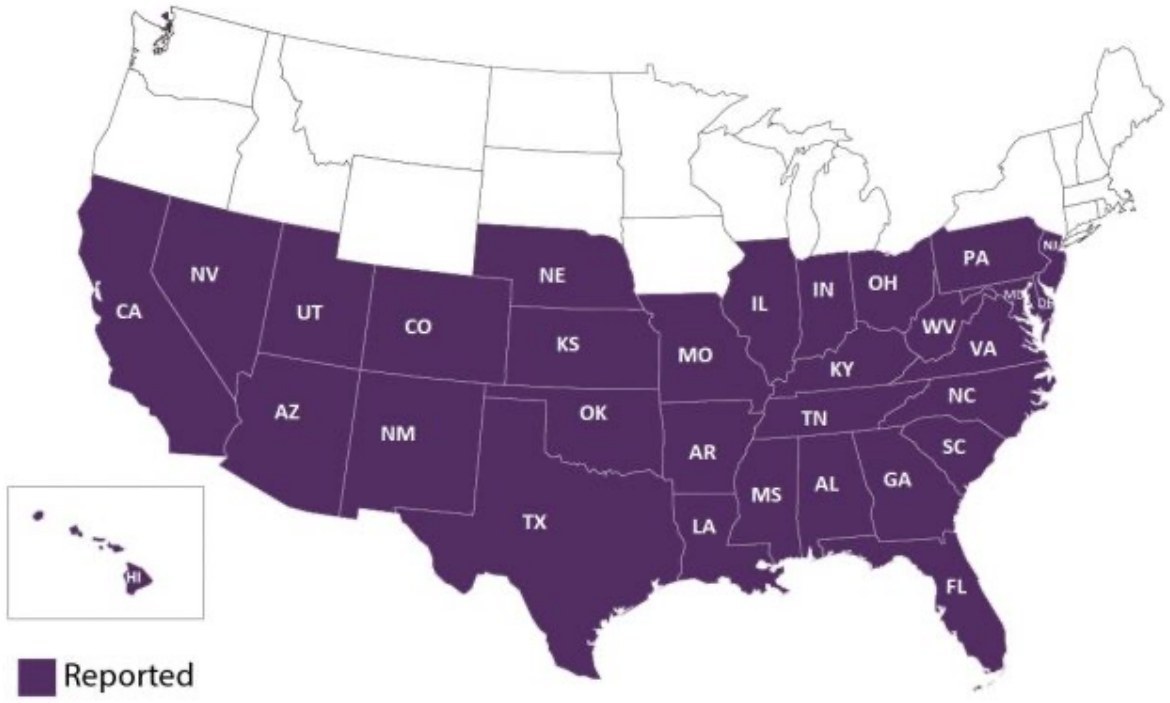
### Other infectious disease prevalence

| | |
|---|---|
| *Dirofilaria immitus*: | **3.3%** |
| *Ehrlichia*: | **3.6%** |
| *Anaplasma*: | **6.9%** |
| *Borrelia*: | **0.2%** |

Recent data from Vida Pharmaceuticals

Quarterly Report 2022

# Triatomines in the U.S.



54.4% of 1510 triatomines across the US—mainly Texas—were infected with *T. cruzi*.[1]

Infection prevalence varies by species, ranging from 10.5% to 66.7%.[1]

Triatomines have been found infected mostly with discrete typing units TcI and/or TcIV, however TCII TcV and TcVI have also been found in the U.S.[2]

1 Curtis-Robles, R., Auckland, L. D., Snowden, K. F., Hamer, G. L., & Hamer, S. A. (2018). Analysis of over 1500 triatomine vectors from across the US, predominantly Texas, for Trypanosoma cruzi infection and discrete typing units. *Infection, Genetics and Evolution*, *58*, 171-180.
2 Dumontell, E.,Pronovost, H., Bierman, E.F., Sanford, A. Majeau, A., Moore, R., & Herrera, C. (2020). Interactions among Triatoma sanguisuga blood feeding sources, gut microbata and Trypanasoma cruzi diversity in Southern Louisiana. *Molecular ecology, 29*(19), 3747-3761.

# Current Chagas Disease Activities

- Education and Outreach
  - CDC cooperative agreement targeting healthcare providers
  - ECHO sessions
  - U.S. Chagas Taskforce
- Research
  - Newborn Screening Pilot
  - Surveillance with Department of Defense

# Outreach Activities to Raise Awareness

- Funded cooperative agreement with CDC 2015-2020 and 2020-2025
  - Developed the Chagas Taskforce – multi-disciplinary group to strategize outreach
  - Extension for Community Healthcare Outcomes (ECHO) model provides continuing education opportunities
  - Nationally accredited Community Health Worker curriculum (in progress)

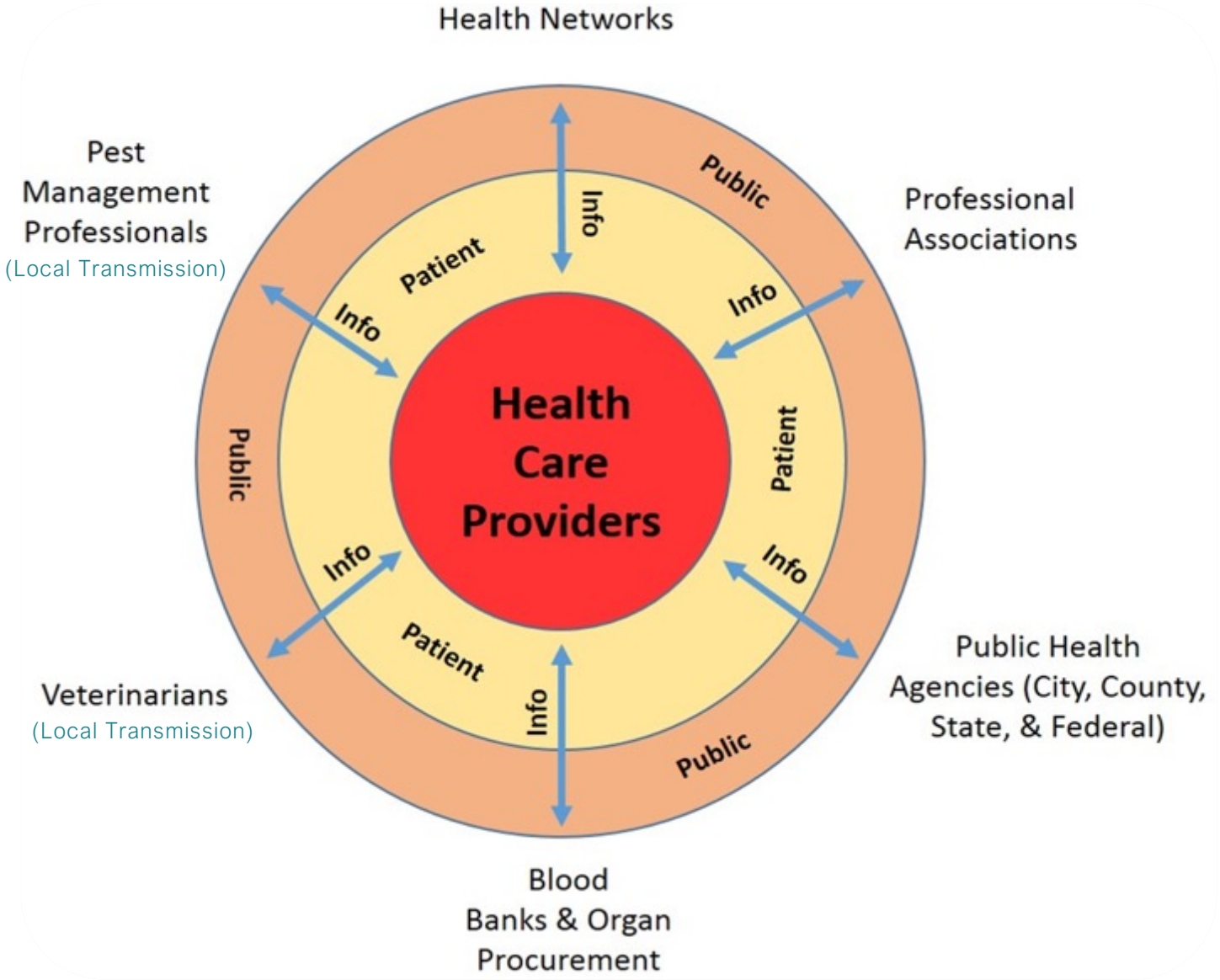

Project ECHO®

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

# Education and Outreach ECHO: Extension for Community Healthcare Outcomes

- Monthly facilitated sessions
- Didactic/case-based presentations
- Free CME
- Clinical and Public Health focused
- One Health Series featuring human, insect and veterinary health

# Chagas Taskforce Model for Collaborative Education and Outreach



# Newborn Screening Pilot

- Validation study:
  - Use of dried blood spots with FDA approved ELISA recombinant v.3.0 test by Weiner
  - Positive samples from CDC
- Pilot:
  - 30,000 dried blood spots from Texas Department of State Health Services newborn screening program

- Goal of project is to assess prevalence of Chagas disease among women of child-bearing age and recommend screening policies/strategies

# DoD Surveillance Project

- Partnering with:
  - Navy Environmental and Preventative Medicine Unit FIVE, San Diego, CA
  - US Army Public Health Command Central San Antonio, TX
  - San Diego State University
  - UTHealth
  - Texas State University
- Goal is to assess prevalence of infected vectors, human prevalence and propose appropriate policies for screening, control and prevention of Chagas in the US Military and Military Working Dogs.

# Challenges and Actions to Improving Awareness of Chagas Disease in the U.S. –

# Bridging the Gap

Curtis-Robles et al. [CC BY 4.0]

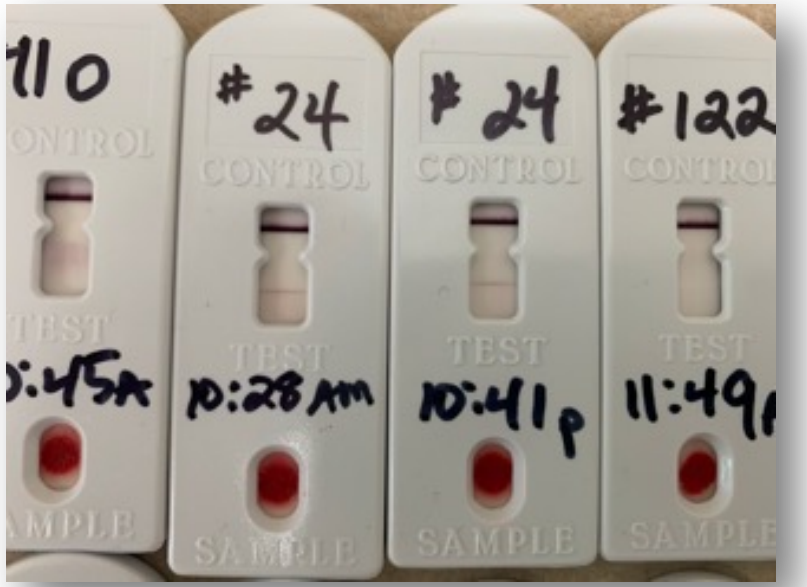
# Actions Needed to Strengthen Health Systems to Scale up Diagnosis and Treatment of CD in the U.S.

| Barriers | Actions |
|---|---|
| Limited knowledge of disease burden | More studies to better understand the burden in the U.S. |
| Few providers offering treatment | Development of a statewide and/or national network of providers |
| Low provider awareness. | Increased health education and protocols for providers |
| Low patient awareness | Public education programs |
| Absence of screening programs | Routine screening programs |
| Limitations in current diagnostic capabilities | Improve diagnostics |
| Access challenges for vulnerable at-risk populations | Use of mobile clinics or telemedicine |

Forsyth, C. J., Granados, P. S., Pacheco, G. J., Betancourt, J. A., & Meymandi, S. K. (2019). Current gaps and needs for increasing access to healthcare for people with Chagas disease in the USA. *Current Tropical Medicine Reports*, *6*(1), 13-22.

# Diagnostics

- Need two separate tests to confirm diagnosis
- CDC provides confirmation
- Need to improve the diagnostics
- Rapid testing with high false positives




# Treatment

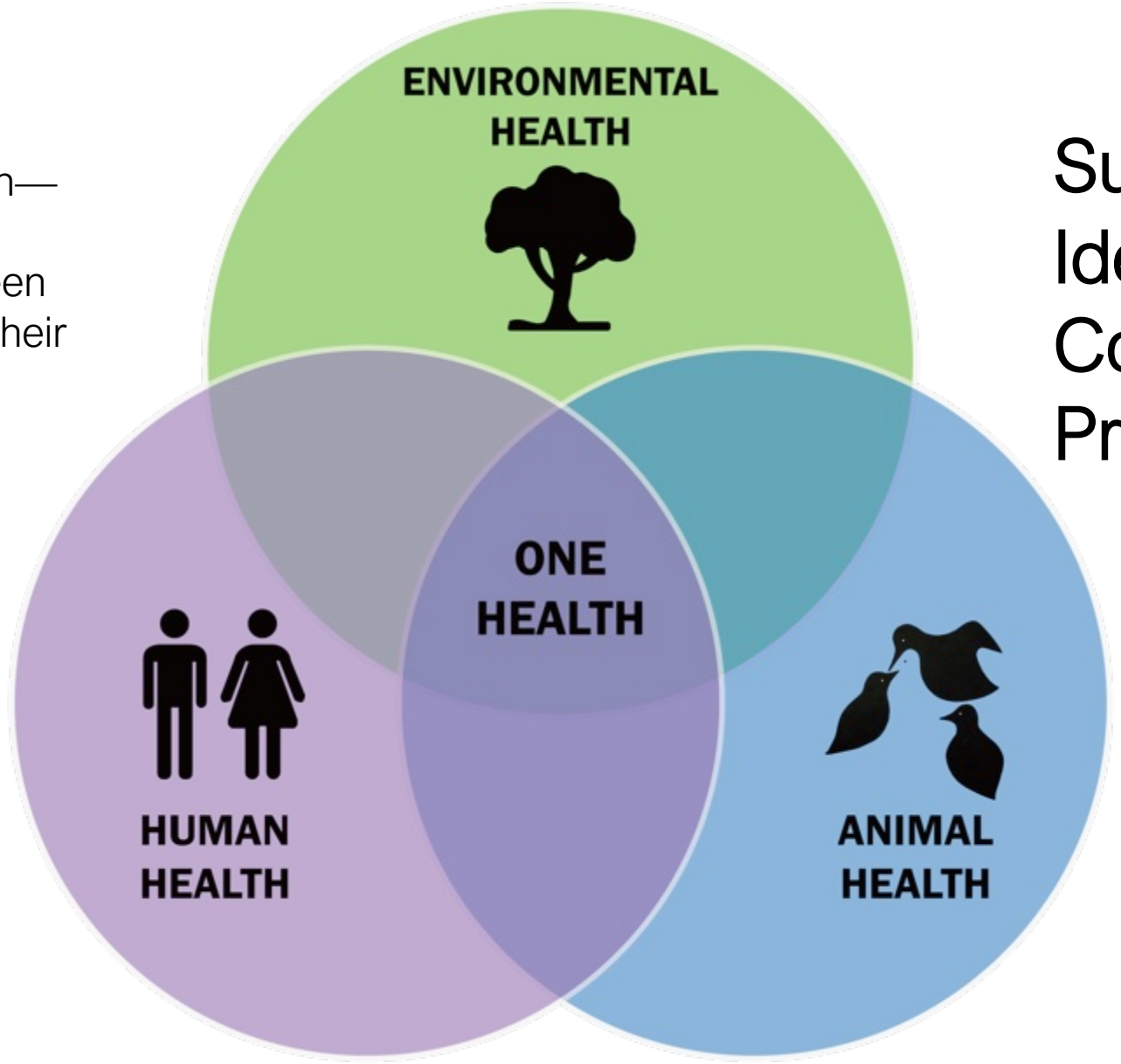
- Benznidazole and Nifurtimox now FDA approved
- Approved for use in children and is affordable
- Patient needs monitoring, especially for side effects

CHAGAS:
SILENT KILLER

# Future directions:
## Rethinking Chagas Disease

# A ONE HEALTH APPROACH

Collaborative, multisectoral approach—recognizing the interconnection between people, animals, and their shared environment.




Surveillance
Identification
Communication
Prevention

Reduce stigma
Improve education

Model for local transmission states??






# Education and Outreach for the Public

# Who to screen for Chagas Disease (Humans)???

- Any first-generation or second-generation Latino/as
- Newborns or children of seropositive women
- Family members of affected patients with Chagas disease
- Blood and organ donors
- First-generation Latino/as with unexplained cardiomyopathy, stroke, arrhythmias, or abnormal electrocardiograms
- First-generation Latino/as at increased risk of Chagas reactivation (e.g. HIV, transplant recipients)
- Pregnant women having lived in endemic areas
- History of living in poverty or substandard living conditions in areas with triatomine activity
- Recognition of kissing bugs
- People with Chagas positive dogs?

Forsyth, C. J., Manne-Goehler, J., Bern, C., Whitman, J., Hochberg, N. S., Edwards, M., ... & Meymandi, S. (2022). Recommendations for screening and diagnosis of Chagas disease in the United States. *The Journal of infectious diseases*, *225*(9), 1601-1610.

# Making a difference…next steps!

- Collaborate, collaborate, collaborate!!
- Synergize our efforts and strengths to saturate the field with Chagas information and access to experts.
- Create and support more champions!
- Target primary care physicians and veterinary practices for screening efforts – build confidence and provide resources.
- Look towards models like the *Promotora* and Tele-Mentoring (ECHO) models to work with hard to reach communities and the providers who serve them

# Thank you!

## CDC

- Susan Montgomery
- Emily Dodd

## MUNDO SANO

## TX DEPARTMENT OF STATE HEALTH SERVICES

- Bonny Mayes
- Zoonosis Control Branch
- Newborn Screening Program

## PARTNERS

- US Army Public Health Command – Central in San Antonio TX
- Navy Environmental Preventative Medicine Unit- 5 in San Diego CA
- San Diego State University – Dr. Jenny Quintana and Dr. Eyal Oren
- University of Texas at El Paso – Dr. Rigoberto Delgado
- UTHealth San Antonio –ReACH Center – Dr. Wari Allison, Andrea Rochat
- South Texas Area Health Education Centers
- Members of the Texas Chagas Taskforce
- Community Health Workers (AHEC groups)
- Texas State University - Dr. Jose Betancourt, Dr. Gerado Pacheco, Prof. Tom Patterson, Dr. Rodney Rohde and Dr. Larry Fulton

# Contact Info

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