A TWO-PRONGED BIG DATA APPROACH TO CRITICALLY ANALYZE *STRONGYLOIDES STERCORALIS* INFECTIONS AMONG RURAL, IMPOVERISHED SOUTH CAROLINA RESIDENTS

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BACKGROUND AND SIGNIFICANCE

- Soil-transmitted helminths: a historical U.S. public health concern
- *Strongyloides stercoralis*: a small worm with big consequences

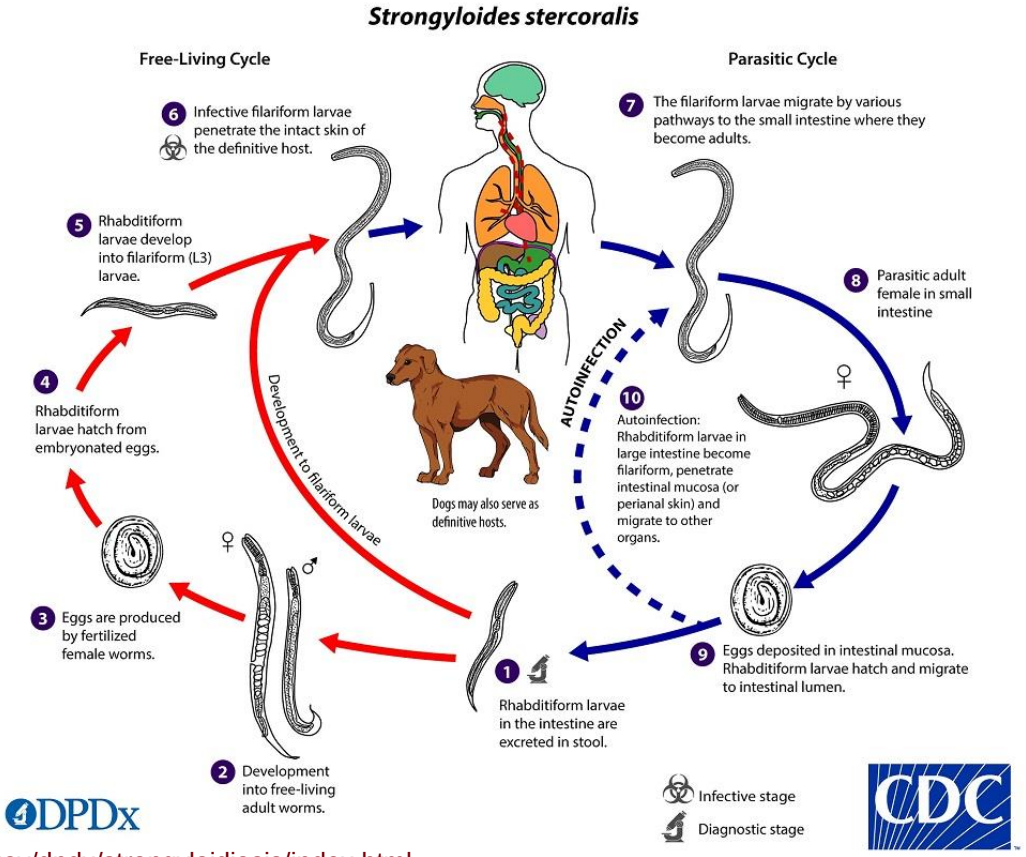

Image source: https://www.cdc.gov/dpdx/strongyloidiasis/index.html

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BUT WHAT DOES THIS HAVE TO DO WITH SOUTH CAROLINA???

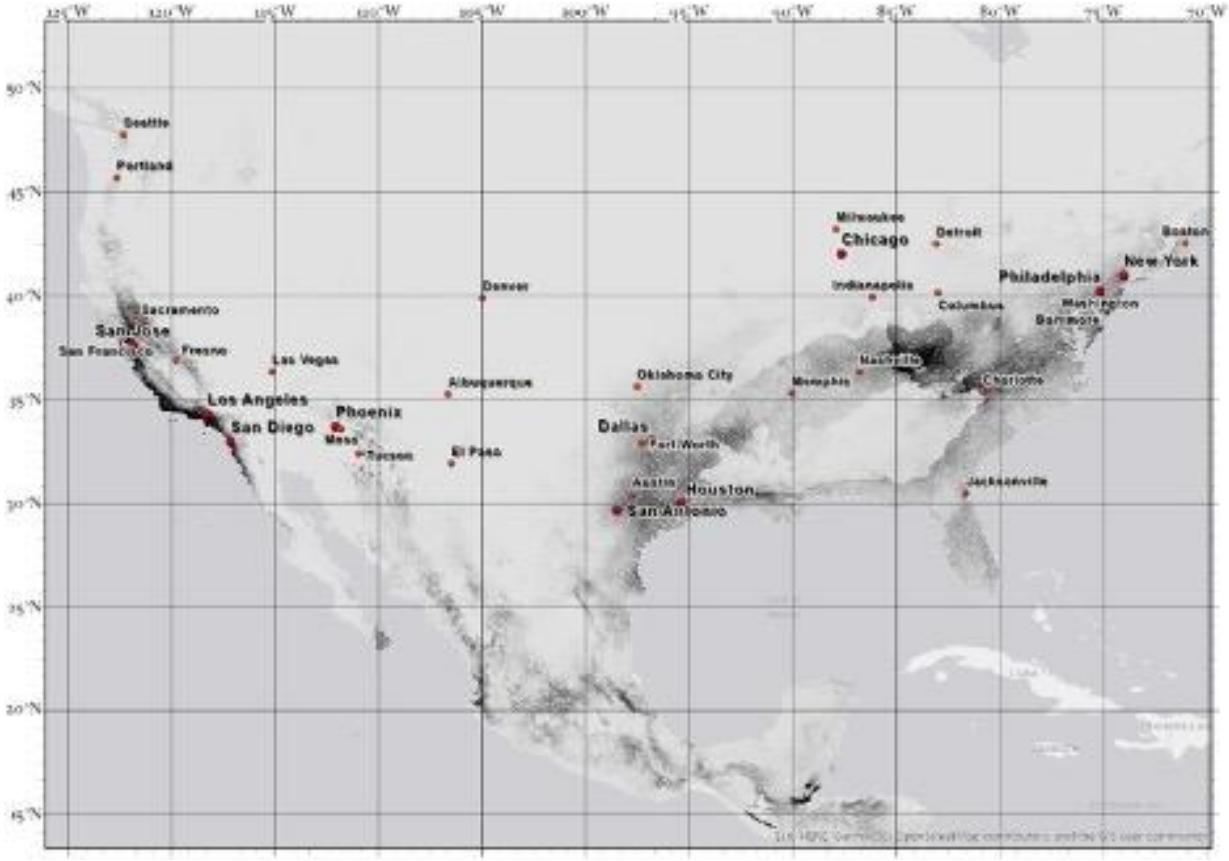

Image source: Singer R, Sarkar S. Modeling strongyloidiasis risk in the United States. *International Journal of Infectious Diseases*. 2020;100:366-372. doi:10.1016/j.ijid.2020.09.002

Image source: https://makeagif.com/gif/human-parasites-live-under-the-microscope-strongyloides-stercoralis-JacUG4

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THE PROBLEM:

DESPITE ROBUST HISTORICAL SURVEILLANCE, LITTLE IS KNOWN REGARDING THE CURRENT BURDEN OF *STRONGYLOIDES* IN THE SOUTHEAST U.S.

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RESEARCH DESIGN AND METHODS

- Active surveillance
  - *Strongyloides IgG/IgM* of banked serum samples from the ALL-IN study
  - Demographic, socioeconomic, exposure data collated from ALL-IN questionnaires
- Passive surveillance
  - Prisma Health electronic health records chart review for the 5-year period 8/16/2017-8/15/2022
  - Demographic, socioeconomic, risk factor, and health outcomes data recorded
  - 1:3 Case:Controls
- Statistics: Fisher's Exact, Chi Square tests utilizing Stata 18

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PHASE 1 RESULTS: DATA ABSTRACTION

		Totals	Negatives	Positives
Age	<18	15 (13.51%)	11 (13.25%)	4 (14.29%)
	18-29	19 (17.12%)	13 (15.66%)	6 (21.43%)
	30-49	28 (25.23%)	24 (28.92%)	4 (14.29%)
	50-69	31 (27.93%)	21 (25.30%)	10 (35.71%)
	70+	18 (16.22%)	14 (16.87%)	4 (14.29%)
Gender	Male	54 (48.65%)	36 (43.37%)	18 (64.29%)
	Female	57 (51.35%)	47 (56.63%)	10 (35.71%)
Race	White	54 (48.65%)	39 (46.99%)	15 (53.57%)
	Black	13 (11.71%)	9 (10.84%)	4 (14.29%)
	Hispanic	14 (12.61%)	9 (10.84%)	5 (17.86%)
	Asian	27 (24.32%)	25 (30.12%)	2 (7.14%)
	Not listed	3 (2.70%)	1 (1.20%)	2 (7.14%)
Area of Residence	Urban	105 (94.59%)	80 (96.39%)	25 (89.29%)
	Rural	6 (5.41%)	3 (3.61%)	3 (10.71%)
Insurance Status	Private	27 (24.32%)	22 (26.51%)	5 (17.86%)
	Public	73 (65.77%)	52 (62.65%)	21 (75.00%)
	Not insured	11 (9.91%)	9 (10.84%)	2 (7.14%)
Local Exposure	No	105 (94.59%)	83 (100.00%)	22 (78.57%)
	Yes	6 (5.41%)	0 (0.00%)	6 (21.43%)
International Travel	No	96 (86.49%)	72 (86.75%)	24 (85.71%)
	Yes	15 (13.51%)	11 (13.25%)	4 (14.29%)
Resided Internationally	No	64 (57.66%)	53 (63.86%)	11 (39.29%)
	Yes	47 (42.34%)	30 (36.14%)	17 (60.71%)
TOTALS:		**111 (100.00%)**	**83 (74.80%)**	**28 (25.20%)**

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PHASE 1 DATA ABSTRACTION RESULTS

- Compared to controls, cases:
  - Were significantly more likely to a "local exposure" (significant time outdoors, gardening, hunting, etc.)
- Otherwise, we found no significant differences in:
  - Race/ethnicity
  - Urban vs. Rural
  - International travel
  - Resided internationally
  - Substance use
  - Employment status
  - Comorbidities: asthma, HIV, malnutrition
  - Clinical outcomes of encounter: 30d readmission, ICU admission, mortality

PHASE I RESULTS: SEROLOGY STUDY

		Totals	Negatives	Positives
Age	<18	70 (4.45%)	67 (4.48%)	3 (3.90%)
	18-24	294 (18.70%)	282 (18.86%)	12 (15.58%)
	25-34	188 (11.96%)	182 (12.17%)	6 (7.79%)
	35-44	210 (13.36%)	201 (13.44%)	9 (11.69%)
	45-54	219 (13.93%)	208 (13.91%)	11 (14.29%)
	55-64	256 (16.28%)	244 (16.32%)	12 (15.58%)
	65+	334 (21.25%)	310 (20.74%)	24 (31.17%)
Gender	Female	985 (62.66%)	938 (62.74%)	47 (61.04%)
	Male	578 (36.77%)	548 (36.66%)	30 (38.96%)
Race/Ethnicity	White	248 (15.78%)	231 (15.45%)	17 (22.08%)
	Black	382 (24.30%)	350 (23.41%)	32 (41.56%)
	Hispanic	22 (1.40%)	20 (1.34%)	2 (2.60%)
	Multiracial	11 (0.70%)	11 (0.74%)	0 (0.00%)
	Asian	14 (0.89%)	14 (0.94%)	0 (0.00%)
	Native American	1 (0.06%)	1 (0.07%)	0 (0.00%)
	Other	845 (53.75%)	822 (54.98%)	23 (29.87%)
Education	Some high school, no diploma	191 (12.15%)	179 (11.97%)	12 (15.58%)
	High school degree or GED	442 (28.12%)	419 (28.03%)	23 (29.87%)
	Some college	303 (19.27%)	295 (19.73%)	8 (10.39%)
	Assocaites degree	105 (6.68%)	104 (6.96%)	1 (1.30%)
	Bachelors degree	170 (10.81%)	162 (10.84%)	8 (10.39%)
	Gradaute degree or above	175 (11.13%)	166 (11.10%)	9 (11.69%)
TOTALS:		**1,572 (1.00)**	**1,495 (95.10%)**	**77 (4.90%)**

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PHASE 1 SEROLOGY RESULTS

- Compared to controls, cases:
  - Were significantly more likely to have completed LESS education
  - Were more likely to have an estimated annual income between $50,000-100,000
- Otherwise, we found no significant differences in:
  - Race/ethnicity
  - Occupation
  - Urban vs. Rural
  - Outdoor exposure
  - Presence of chronic asthma

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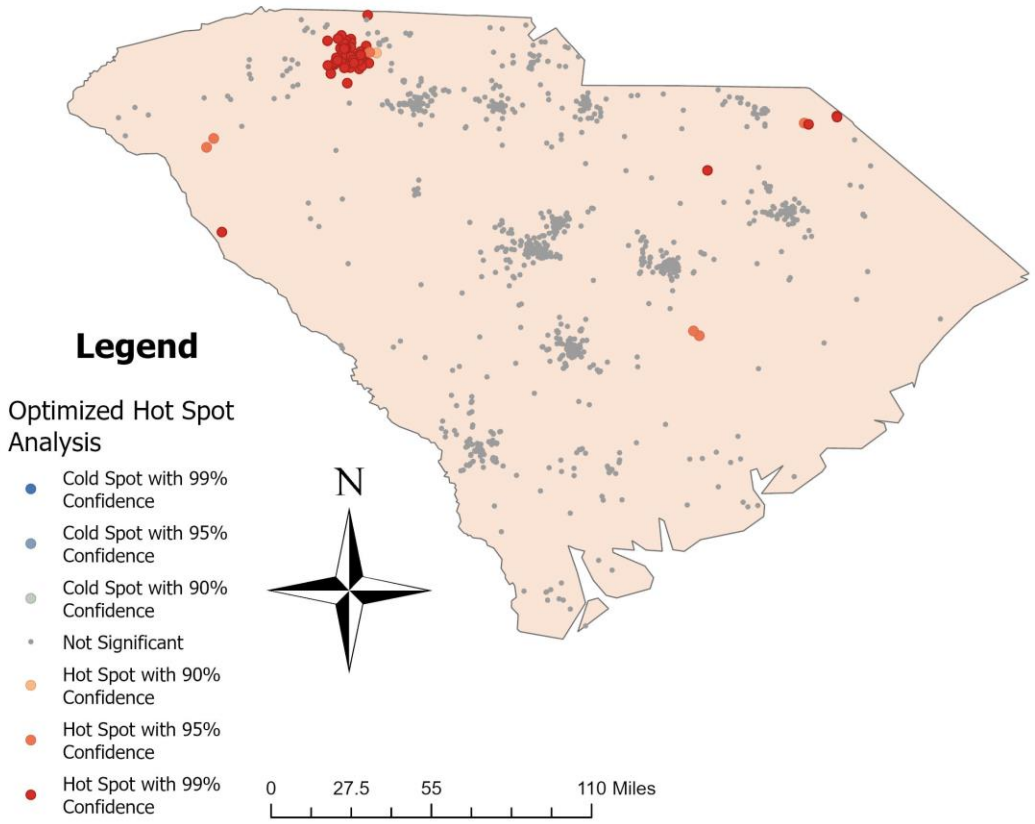
GEOSPATIAL ANALYSIS



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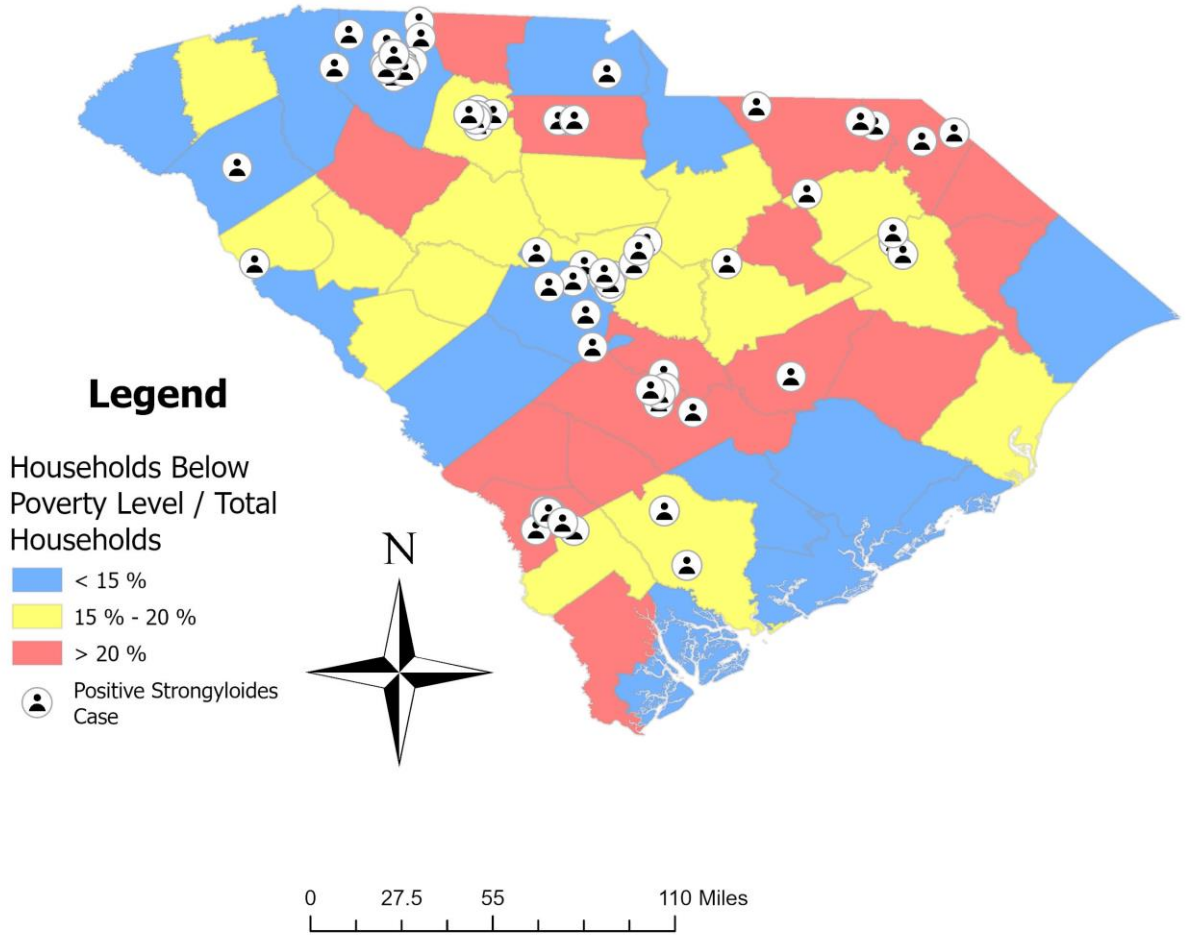

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DISCUSSION

- Chart abstraction
  - Significant selection bias present
  - Numbers very small
  - Unable to correlate clinical outcome with diagnosis
- Serology Study
  - More cases than expected
  - Age distribution: bimodal (older adults, university students?)
  - Scattered urban and rural hotspots
  - Questionnaire data limited: Will necessitate follow up to further characterize

PHASE II: IN PROCESS!

- Contacting seropositive cases to share test results, enrollment
- Home visit will accomplish:
  - Survey of home, yard, travel/health history
  - Collection of fecal, urine, serum samples for confirmatory testing
  - Offering treatment for any confirmed cases

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PHASE II PROJECT TIMELINE

	Quarter 1	Quarter 2	Quarter 3
Administrative Activities			
Project start-up logistics (purchase supplies, planning meetings, staff training)	•		
Contact individuals who tested positive for *Strongyloides stercoralis* to arrange home visits	•		
Major Study Related Activities			
SA1: At home visit, collect serum/stool/urine samples to confirm *Strongyloides* infection	•	•	•
SA1: At home visit, discuss/assist *Strongyloides* positive individuals in initiation of treatment pathway	•	•	•
SA2: At home visit, collect participant sociodemographic, economic, health, and exposure characteristics	•	•	•
SA3: At home visit, evaluate surrounding home environment via collection of soil samples	•	•	•
Data Management and Analysis Activities			
SA1: Complete confirmatory laboratory analysis of serum/stool/urine samples		•	•
SA2: Analyze data using descriptive statistics to evaluate for trends among participants' sociodemographic, economic, health, and exposure characteristics		•	•
SA3: Complete soil sample laboratory analysis in the evaluation of participants' surrounding environment		•	•
Project Deliverables			
Presentations, Publications			•

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PHASE II UPDATE:
THE TEAM COMPLETED ITS FIRST 2 FOLLOW-UP VISITS ON JANUARY 30TH! MORE TO COME!

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