



HAWAII STATE  
DEPARTMENT OF HEALTH

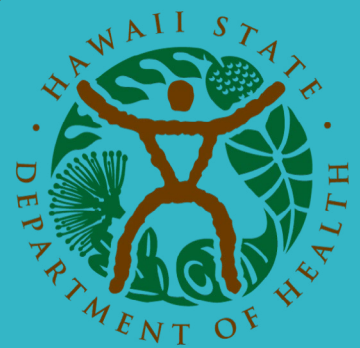
SUPPLEMENTAL  
LEGISLATIVE REPORT  
ON FY 2019 PREVENTION &  
COLLABORATION EFFORTS

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# RAT LUNGWORM DISEASE IN HAWAII

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OCTOBER • 2019



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# A Message from the Health Director

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## A collaborative effort across the state to protect Hawai'i's residents and visitors

In 2017, the Hawai'i State Legislature appropriated \$1 million to the Hawai'i Department of Health to enhance education and outreach to better control and reduce the risk of rat lungworm disease in Hawai'i. Since then, the department has worked diligently to raise public awareness about this potentially devastating disease, how to recognize it, and perhaps most importantly, how to prevent it.

It was clear from the beginning that we would need to mobilize expertise in research and communications, both within and beyond the health department because multiple islands are impacted by rat lungworm disease, especially Hawai'i Island, and it was not always clear why the disease has been spreading so rapidly. Funding from the Legislature made it possible to expand our reach in educating community on risks associated with the disease and how to prevent infection. This was truly a team effort involving many partners in county, state and federal agencies along with academic institutions and community groups.

The Governor's Joint Task Force on Rat Lungworm Disease has been crucial in bringing experts to the table. Joint Task Force members made great progress over the last two years in further defining risk factors and in providing guidance to physicians and healthcare workers on diagnosis and clinical management. We look forward to continuing our participation with the Joint Task Force.

While the health department has taken the lead in spearheading public education, experts at the John A. Burns School of Medicine, the University of Hawai'i at Mānoa, and the University of Hawai'i at Hilo continue to develop and implement important research projects to answer important questions that remain about rat lungworm. Their findings will help guide our public health outreach efforts to prevent illnesses associated with this disease and promote early reporting and treatment.

Although much has been accomplished, rat lungworm disease will undoubtedly be with us for a long time. There is still much that can be done. The Department of Health will work to maintain the momentum gained and, with resources we have at hand, we will strive to continue to educate the public about the disease and to maintain the partnerships developed. We all have the same goal; that is, to control and prevent the spread of rat lungworm disease.



**Bruce S. Anderson, Ph.D., Director**  
Hawai'i State Department of Health

# Introduction

The purpose of this supplemental report is to provide an update on Hawai'i Department of Health's (DOH) continuing activities related to rat lungworm disease in FY 2019. Although angiostrongyliasis, commonly referred to as rat lungworm disease, has been identified in Hawai'i since the early 1960s, concern in the community has grown considerably over the last few years with high-profile cases of individuals with serious and debilitating conditions from the infection.

In 2017, the number of confirmed cases of individuals with rat lungworm disease was higher than in previous years. Because our annual case numbers remain small relative to our population, fluctuations are expected and do occur. For example, in 2017, a cluster of cases was identified on Hawai'i Island, which included a group of

people who drank homemade kava contaminated with an infected mollusk.

The Hawai'i State Legislature appropriated \$1 million in 2017 to enhance DOH's response and outreach activities to further control and prevent the spread of angiostrongyliasis over fiscal years 2018 and 2019.

A report detailing the health department's activities in fiscal year 2018 (July 1, 2017-June 30, 2018) can be found on our Disease Outbreak Control Division's website ([http://health.hawaii.gov/docd/disease\\_listing/rat-lungworm-angiostrongyliasis/#additional\\_resources](http://health.hawaii.gov/docd/disease_listing/rat-lungworm-angiostrongyliasis/#additional_resources)) and accessed directly at [https://health.hawaii.gov/docd/files/2018/05/RLWD\\_2018\\_Leg\\_Report\\_032218.pdf](https://health.hawaii.gov/docd/files/2018/05/RLWD_2018_Leg_Report_032218.pdf).

# Update on Case Counts

Angiostrongyliasis has been reportable to the Hawai'i Department of Health since 2007. Clinicians are required to report patients with eosinophilic meningitis, and laboratories are required to provide cerebrospinal fluid results and specimens for such patients. Over the years, DOH's State Laboratories Division has worked with all clinical laboratories in the state to ensure reports and specimens for suspect cases are submitted to the state for investigation and follow up. When suspected cases are reported to DOH, disease investigators work closely with the patients to carefully examine where they live, work, recreate, or may have traveled in order to identify how they may have become infected.

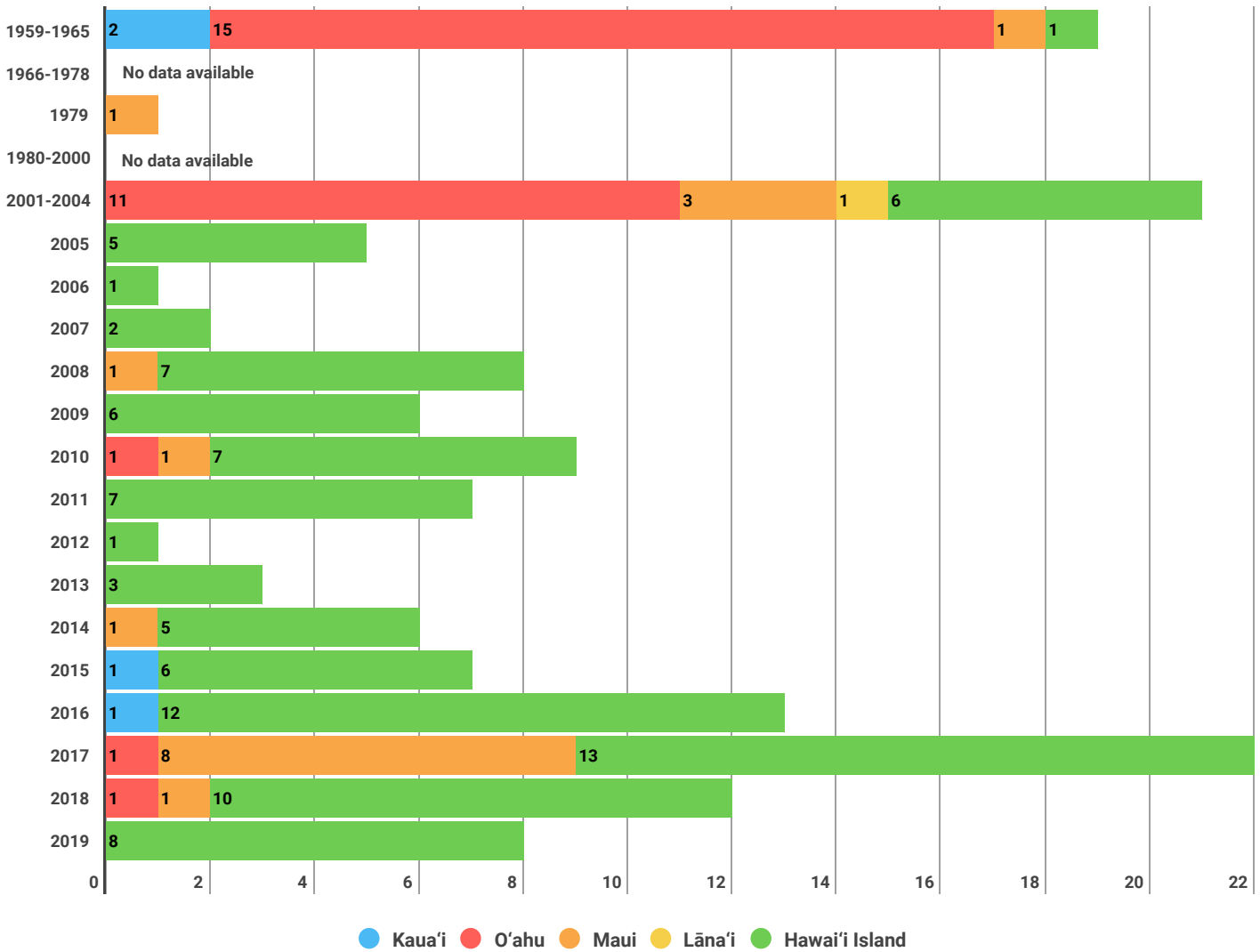
Since 2007, there have been 63 laboratory-confirmed cases\* and 40 probable cases\*, resulting in a total of 103 cases statewide reported to the health department since tracking of angiostrongyliasis began that year. Two adult deaths related to the disease have been reported in Hawai'i: one in 2012 and another in 2015.

\*Note: "Confirmed" cases refer to laboratory-confirmed cases for which a lumbar puncture sample was provided for testing and the test was positive, or the actual parasite was visualized (rare occurrence). "Probable" cases refer to cases that were not laboratory-confirmed, but the individuals had symptoms, laboratory findings (specifically in cerebrospinal fluid), and a history of contact with snails or slugs, all consistent with probably having been infected.

	Hawaii Island		Maui		Oahu		Kauai		Statewide	
	Confirmed	Probable	Confirmed	Probable	Confirmed	Probable	Confirmed	Probable	Confirmed	Probable
2016	11	1	0	0	0	0	1	0	11	1
2017	11	2	7	1	1	0	0	0	19	3
2018	8	2	1	0	1	0	0	0	10	2
2019	7	1	0	0	0	0	0	0	7	1

**Chart of confirmed and probable angiostrongyliasis cases in Hawai'i by county from 2016 to 2019.** Source: Hawai'i Department of Health, Disease Outbreak Control Division. Notes: In 2019, of the 7 laboratory-confirmed cases on Hawai'i Island, 4 of the cases were non-residents who contracted the disease during their visit to Hawai'i. In 2018, of the 8 laboratory-confirmed cases and 2 probable cases on Hawai'i Island, 2 of the confirmed cases and 1 of the probable cases were non-residents who contracted the disease during their visit to Hawai'i. In 2017, of the 7 laboratory-confirmed cases on Maui, 3 of the cases were non-residents who contracted the disease during their visit to Hawai'i. In 2016, of the 11 laboratory-confirmed cases on Hawai'i Island, 1 case was a non-resident who contracted the disease during their visit to Hawai'i.

## Number of Rat Lungworm Disease Cases in Hawai'i by County from 1959 to 2019



**Number of Rat Lungworm Disease Cases in Hawai'i by County, 1959 to Oct. 2019.** Sources: Modified from [Cowie, R., ACS Chemical Neuroscience, 2017](#); [Kuberski, T et al., Journal of Clinical Microbiology, 1979](#); [Hochberg NS, Park SY, Blackburn BG, et al., Emerging Infectious Diseases, 2007](#); and [data](#) from Hawai'i Department of Health, Disease Outbreak Control Division. Note: Numbers include totals of confirmed and probable cases for each year.

## How people get sick from rat lungworm

1. Infected rats pass the worm in their droppings.



2. Slugs and snails get the worm by eating rat droppings. Freshwater prawns, frogs, crayfish, snails, and crabs get the worm by eating slugs or snails.



3. People get sick accidentally by eating tiny slugs or snails on unrinsed, raw produce. People can also get sick from eating undercooked slugs, snails, or freshwater prawns, frogs, crayfish, or crabs.



## SIGNS & SYMTOMS



Not everyone will have the same symptoms. They usually start 1 to 3 weeks after infection. Illness can last for 2 to 8 weeks or longer.



- Severe ongoing headache
- Nausea and vomiting
- Neck and back stiffness
- Tingling or painful skin
- Low-grade fever
- Although rare, coma and death



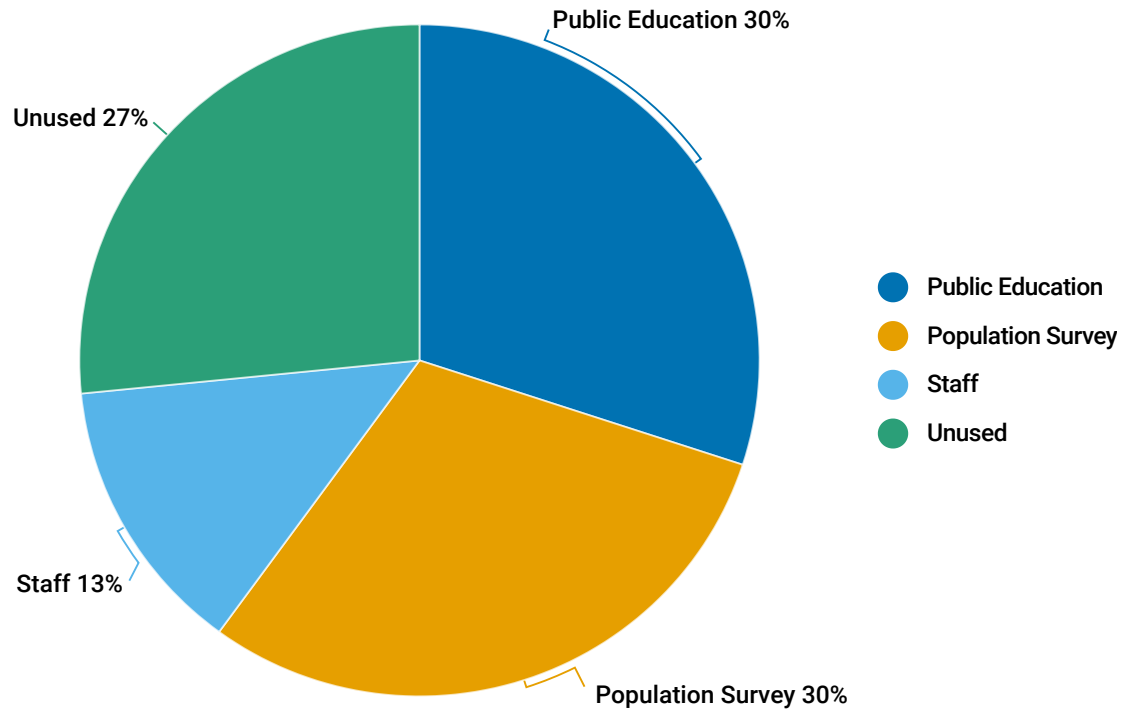
Children may have behavioral changes such as unusually bad temper, mood changes, or extreme tiredness.

**See your doctor as soon as possible if you think you may have been infected.**

# Budget Breakdown

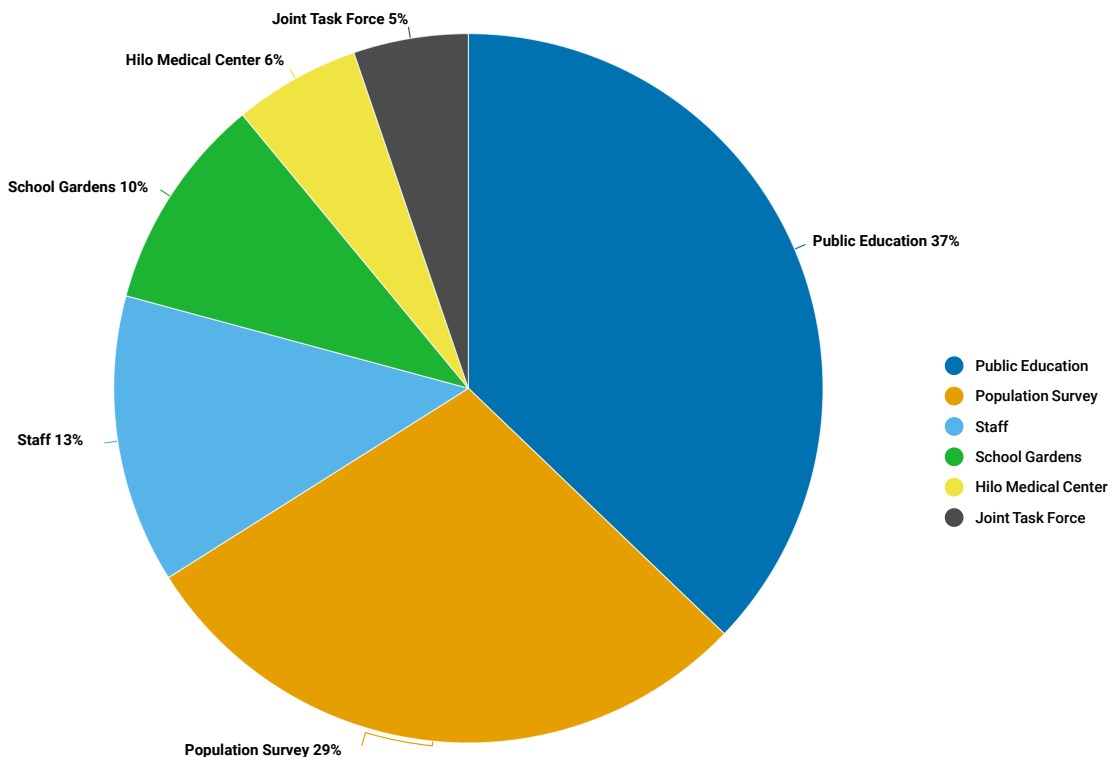
## Year 1 Budget Summary

The first year of the legislative appropriation was committed mainly toward a widespread, multi-faceted public outreach and education campaign along with a population survey to better understand community risk factors for rat lungworm disease infections. A portion of the funding did go unused. It was supposed to fund a coordinator position for the initiative but the department was unable to fill the position. The funding lapsed and was returned to the general fund.



## Year 2 Budget Summary

The second year of the legislative appropriation continued to support public outreach and education initiatives as well as a second data collection set for the population survey. The department also coordinated a number of grants to partner organizations committed to furthering education and control of rat lungworm disease in Hawai'i.



# Year 1: Communications Approach and Summary of Activities

Prevention and mass public education were at the core of the first year of the campaign. The health department understood that there were serious concerns across the state about rat lungworm disease, and the major goal of the initial effort was to increase awareness and understanding of the risks of the disease statewide and correct misinformation.

Key messages included:

- Practice safe eating habits by washing produce thoroughly regardless of where it came from and/or cooking it. Inspect food before consuming it.
- Eliminate snails, slugs, and rats—all of which are potential vectors for the disease—both around residential home gardens and agricultural operations of all scales.
- Prevent the consumption of snails and slugs by covering all containers, from water catchment tanks to drink and food dishes, and supervising small children outdoors.

Secondary messages were developed to supplement the primary messages because angiostrongyliasis is a unique issue in that diverse stakeholders are affected by the threat of the disease. Targeted sample messages included:

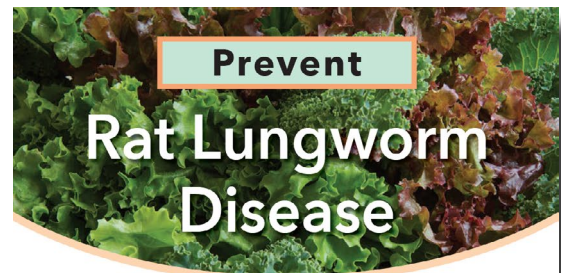
**Messages for Farmers (from Department of Agriculture [HDOA]):** Take extra precautions to reduce rodent, snail, and slug populations in and around your crops. Inspect your produce carefully before transferring it to retailers to prevent the spread of snails and slugs that may accidentally be on, for example, fruits, vegetables, decorative plants, and flowers.

**Messages to Consumers (from Department of Agriculture [HDOA]):** Local produce is safe to eat. Just make sure to follow safe food handling and preparation practices as recommended by DOH to reduce the risk of angiostrongyliasis in addition to other food-borne illnesses.

**Messages to Retailers and Restaurants:** If your business receives a shipment from any farmer or vendor (local or mainland) with an infestation of slugs or snails, contact the DOH District Health Office in your area (on O'ahu, contact the main DOH Sanitation Branch) to schedule a visit from an inspector.

DOH will work collaboratively with local representatives from HDOA to visit the farm (if local) where the produce was grown or the local distributor (if from the mainland) to ensure proper pest reduction measures are being implemented. All Hawai'i food establishments are required to wash produce thoroughly before preparing and serving in compliance with state food safety regulations.

Strategies and tactics used during the first year of the public information campaign can be found in the 2018 Legislative Report, pages 10-14 at: [https://health.hawaii.gov/docd/files/2018/05/RLWD\\_2018\\_Leg\\_Report\\_032218.pdf](https://health.hawaii.gov/docd/files/2018/05/RLWD_2018_Leg_Report_032218.pdf)



## Safe eating is healthy eating



**WASH PRODUCE.** Rinse and rub all fruits and vegetables thoroughly under clean running water. Check single leaves of leafy vegetables carefully for tiny slugs and snails. Whether produce is from a farmer's market, pre-washed from a store, or fresh from a garden, rinse it carefully.



**KILL SLUGS & SNAILS.** Apply slug bait according to label directions. Keep pets and children away from the poison. Throw away dead slugs and snails in a sealed container. Do not touch them with your bare hands; use gloves.



**CONTROL RATS.** Use bait and traps to catch rats. Follow label directions. Keep pets and children away from the poison. Put dead rats in a double sealed plastic bag and throw away. Keep your property clean to keep rats away.



**COOK FOOD.** Thoroughly cook freshwater prawns, frogs, crayfish, snails, and crabs by boiling them for 3-5 minutes or heating to 165 degrees Fahrenheit for at least 15 seconds. Cooking fruits and vegetables also prevents infection.



**COVER TANKS & CONTAINERS.** Cover and protect your catchment tank. Clean and inspect it regularly. Slugs and snails can crawl up the tank and get into the water. Always cover drinking containers when outdoors.

**WATCH CHILDREN CAREFULLY.** Keep a close eye on keiki playing outside and don't let them play with slugs or snails. Clean and wipe toys that have been left outside. Keep children away from areas where rat, slug, snail, and other pest poisons are used.



# Approach, Partnerships and Initiatives

## Summary

Public education and outreach remained at the center of the second year of the campaign. However, the approach and strategies used were slightly different and focused on building community partnerships to further education. The Department of Health sought out opportunities to provide funding to partners who could provide unique education and outreach opportunities to better reach some of the target audiences identified during the first year of the campaign.

## Governor's Joint Task Force on Rat Lungworm Disease: Leading the way to improved diagnosis, physician education and community outreach

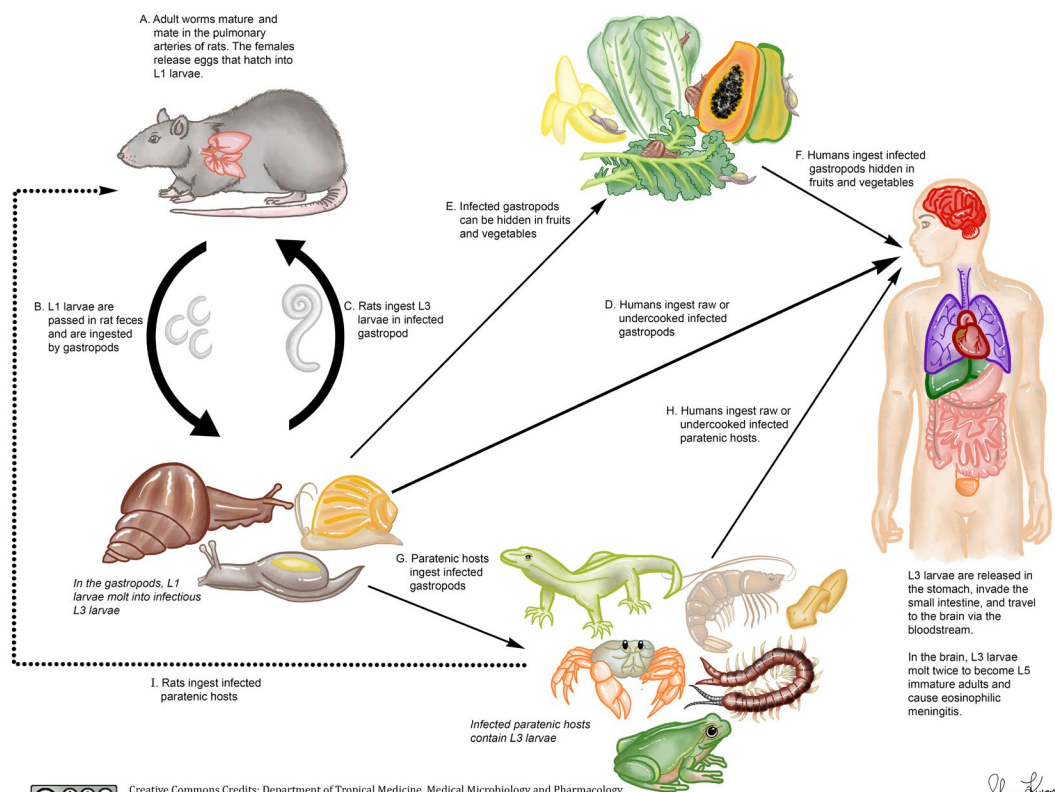
In May 2016, DOH and the East Hawai'i Liaison to the Office of the Governor announced the establishment of a Joint Task Force to assess the threat of angiostrongyliasis in Hawai'i and to develop strategies to mitigate that threat. Experts from medical, scientific, environmental, agricultural and public health fields from across the state were brought together to share scientific knowledge in the application of diagnostics, treatment, mitigation and public education. Since then, the Joint Task Force and DOH have worked closely to partner on educational initiatives across the state.

The Clinical Subcommittee, made up of expert physicians and infectious disease specialists from across the state, spent the last year researching and consulting with national and international specialists on the disease to carefully craft the new guidelines. For example, to learn more about the disease and its current understanding, subcommittee members attended the American Society of Tropical Medicine and Hygiene Annual Meeting in Baltimore, MD, in 2017 and a subsequent convention in Thailand, where experts on angiostrongyliasis from around the world gathered to share the latest developments in disease management.

## Preliminary Clinical Guidelines for Diagnosis and Treatment of Rat Lungworm Disease in Hawai'i

One of the major undertakings by the Joint Task Force's subcommittee on clinical management is to develop detailed, evidence-based guidelines, including diagnosis and treatment protocols, to help local physicians better recognize symptoms and take prompt action.

Prior to the extensive work completed by the subcommittee, there were no diagnosis and treatment



**Life cycle of *A. cantonensis*.** Source: Preliminary Guidelines for the Diagnosis and Treatment of Human Neuroangiostrongyliasis (Rat Lungworm Disease) in Hawai'i, Governor's Joint Task Force, 2018.



protocols available to Hawai'i physicians for this potentially serious and debilitating disease. Diagnosing angiostrongyliasis can be problematic because patients infected with the parasite do not always present with the same symptoms. These preliminary guidelines provide critical guidance to physicians to help them make timely and accurate diagnoses and give their patients the best possible treatment available.

The preliminary guidelines call for a complete neurologic examination; a detailed history of possible exposure to snails/slugs, rats, or other items in the patient's history suggesting a risk for infection; and a lumbar puncture, or spinal tap, to diagnose the disease and relieve headaches caused by the disease. Steroids should be given as early as possible to reduce inflammation. Anti-parasitic drugs, such as albendazole, may be helpful, although there is limited evidence of this in humans. If albendazole is used, it must be combined with steroids to treat any possible increase in inflammation caused by dying worms. Persons with symptoms should consult their healthcare provider for more information.

When the preliminary guidelines were first [announced](#), the health department hosted a virtual grand rounds for healthcare providers and practitioners to access. Additionally, DOH provided funding to the Joint Task Force to develop a Continuing Medical Education (CME) course curriculum and conduct a circuit of workshops in all four counties for clinicians to earn credit. The first CME course was held in Hilo on Hawai'i Island in October 2018. The remaining workshops will take place on Maui, O'ahu and Kaua'i before the end of 2019. The preliminary guidelines are available to the public in full online at [http://health.hawaii.gov/docd/disease\\_listing/rat-lungworm-angiostrongyliasis/#info\\_for\\_clinicians](http://health.hawaii.gov/docd/disease_listing/rat-lungworm-angiostrongyliasis/#info_for_clinicians).

### **Residential Survey**

Another Joint Task Force initiative will include a survey of Hawai'i Island and Maui residents. The purpose of the survey is to learn from residents what their knowledge, attitudes and practices regarding prevention are, and to get a better understanding of how effective DOH's educational media campaign has been to build awareness of the disease. The survey will be designed and implemented by Joint Task Force members along with students at the University of Hawai'i John A. Burns School of Medicine. Surveys will be conducted in-person and one-on-one. Activities will focus on gathering information from remote areas on both islands that seem to be heavily affected by the disease, including Puna on Hawai'i Island and Hana on Maui. Data collected during the surveys will help guide DOH when developing future messaging and outreach strategies. The survey will take place before the end of 2019.

### Local News

## Doctors receive new guidelines to diagnose, treat rat lungworm disease in Hawaii

By: Web Staff

Posted: Aug 30, 2018 01:50 PM HST  
Updated: Aug 30, 2018 07:58 PM HST



### **Hilo Medical Center: Providing vital support for survivors and caregivers**

In November 2017, Hilo Medical Center (HMC) formed a Rat Lungworm Disease Support Group after survivors and their caregivers voiced a need for education, guidance, and support in the aftermath of contracting the disease. The group first met in December 2017 in Kea'au and continues to meet regularly on a monthly basis. Attendees include survivors, caregivers, healthcare providers, researchers from the University of Hawai'i Daniel K. Inouye College of Pharmacy and University of Hawai'i at Manoa, advocates, legislators and staff from DOH.

HMC is responsible for managing the support group, securing a meeting space, and informing and reminding the community about the meeting. DOH provided funding support to help offset costs HMC incurs to host these vital meetings. The support group continues to meet monthly and now provides remote online access to participants who are unable to join the meetings in person. More information can be found at <https://www.hilomedicalcenter.org/our-services/support-groups/rat-lungworm-support-group/>.

Funding provided by DOH will also help to support another HMC initiative, which will focus on assessing long term prognosis and rehabilitation of survivors through a comprehensive assessment. This assessment will include an MRI to assess permanent structural damage as well as a comprehensive cognitive, psychological, and functional assessment. HMC has assembled the necessary assessment tools and a resource pool that includes a case manager, speech pathologist, and occupational therapist.

## Visitor Industry: State agencies step up to educate visitors

Visitors are a crucial target audience for this education campaign and work is continuing in order to engage travelers during their stay in the islands to ensure they are well-equipped to protect themselves during their visit.

The Hawai'i Tourism Authority (HTA) provided a funding match to do a refreshed large-scale advertising campaign in malls and shopping centers. Hawai'i malls and shopping centers across the state serve as major attractions to residents and visitors alike. HTA selected Ala Moana Center and Waikēle Premium Outlets as venues for the campaign because of the exposure and impact those locations have on visitors. The campaign launched in January 2019 and ran through August 2019.

Through a partnership with the Hawai'i Department of Transportation Airports Division, the U.S. Centers for Disease Control and Prevention (CDC) donated two monitors, which are stationed in the interisland terminal in Honolulu's Daniel K. Inouye International Airport. The monitors display a rotating slide deck to increase awareness of potential health risks, such as angiostrongyliasis, to visitors to Hawai'i, and to provide education on healthy practices during their stay in Hawai'i.

Additionally, the health department, with the support of HTA, was able to secure space on all baggage claim monitors placed in Honolulu's Daniel K. Inouye International Airport, Hilo Airport on Hawai'i Island and Līhu'e Airport on Kaua'i. When flight information is not displayed on the monitors, graphics reminding travelers to heed good food safety practices to prevent foodborne illnesses like rat lungworm disease cycle onto the screen as part of a loop of scenic images of the islands.



# Enjoy Fresh Fruits and Vegetables Safely

Wash produce thoroughly and inspect food before eating.

Prevent foodborne illnesses like rat lungworm disease.  
<http://health.hawaii.gov>



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Wash produce thoroughly and inspect food before eating.

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## Hawai'i Farm to School Hui: Reaching students, teachers, parents and the community

The health department was approached with a unique partnership opportunity in 2018 by the University of Hawai'i at Hilo and the Hawai'i Farm to School Hui. Through the University Health Partners of Hawai'i, DOH provided funding to support the Farm to School Hui in providing one-day workshops as well as Professional Development Education (PDE3) courses to teachers about rat lungworm disease and prevention in local school gardens. Classroom visits were also offered to Hawai'i Island schools. The workshops were held on all islands and provided teachers with the tools to teach their students about preventing rat lungworm disease. It also gave students the opportunity to take science into their own hands. More information on the curriculum developed is at <http://pharmacy.uhh.hawaii.edu/rat-lungworm/lesson-plans-teachers>.

### PDE3 Courses

The PDE3 course, developed and facilitated by Kathleen Howe, was offered to all Hawai'i Department of Education teachers and was successfully completed by 15 K-12 teachers, the majority of which were from Hawai'i Island with three teachers from Maui participating. The Hawai'i Department of Education requires 24 hours of teacher contact time for a PDE3 course. For this course, 16 hours were resolved by attendance in a two-day workshop, with the final 8 hours divided evenly between two online-workshops, weekly email interactions between course participants and instructors, and a final, online presentation by each of the course participants.

Three two-day in-person workshops were held in October and November 2018 at Kalaniana'ole Elementary School, Kanu o ka 'Aina Learning Center and Waimea Middle School. Grade levels represented by participating teachers included kindergarten, 2, 3, and 6-12. All teachers involved in the PDE3 course adapted at least two lessons from the curriculum in the Teacher Manual to fit their class. All course participants were required to give some type of presentation to a community group. Through the PDE3 course activities, instructors reached 652 students, educated 86 teachers and staff members, and reached about 900 community members including parents.



### One-Day Workshops

In addition, one-day non-credit workshops were organized for rat lungworm disease outreach to Hawai'i Island, Moloka'i, Maui, O'ahu and Kaua'i. At each of these workshops, participants were given a copy of the Teacher Manual, which contains an integrated pest management (IPM) plan, 11 classroom-ready lessons, and supplementary materials that include a master data sheet and a slug/snail ID file, which lists species that have currently been identified at participating school gardens.

Planning of the workshops was a collaborative effort between the Hawai'i Farm to School Hui, the O'ahu School Gardens Network and representatives from each island. The schedule of one-day workshops was as follows:

- July 24, 2018: I'olani School (O'ahu)
- September 29, 2018: Hawai'i Preparatory Academy (Hawai'i Island)
- June 3, 2019: University of Hawai'i Maui College (Moloka'i)
- June 5, 2019: University of Hawai'i West O'ahu (O'ahu)
- June 6, 2019: Kawaikini New Century Public Charter School (Kaua'i)
- June 7, 2019: Kalama Intermediate School (Maui)

More than 100 participants took advantage of the workshops in 2018 and 2019. Participants came from diverse arenas, which included but were not limited to Hawai'i public and private K-12 schools, Kokua Hawai'i Foundation, Hawai'i Farm to School Hui, Maui and O'ahu School Garden Networks, Hawai'i Department of Education, Hawai'i Department of Health, Hawai'i Department of Land and Natural Resources, University of Hawai'i College of Tropical Agriculture and Human Resources, invasive species committees (Hawai'i Island, O'ahu, Maui, Kaua'i), Hawai'i Farmers Union United (Hana Chapter), Pu'u o Hoku Ranch, Anahola Farm, and BEI Hawai'i.

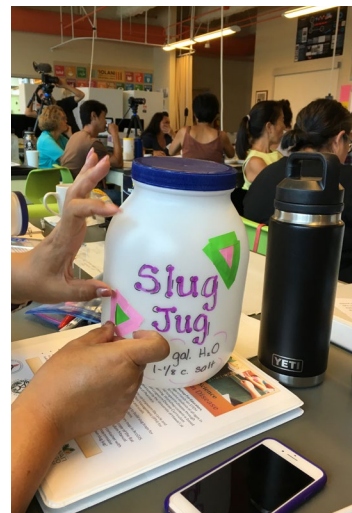
In-person individual classroom visits using Blackboard Collaborate were offered to all K-12 schools on Hawai'i Island. Virtual classroom visits extended the project's range considerably and they encouraged the use of Blackboard Collaborate, to which all teachers have access. This technology can be used to bring professionals into the classroom and can increase student access to career connections. There has been an increase in numbers of teachers requesting virtual classroom visits and the Farm to School Hui will work to acquire additional sources of funding to accommodate the growing need.

School	Number of Classes
Kamehameha Schools Hawai'i	10
Kea'au Elementary School	3
Hawai'i Academy of Arts and Science	2
Mountain View Elementary School	2
Kealakehe Intermediate School	2
Waikaloa Middle School	4
Kohala Intermediate School	6
Honoka'a Elementary School	1

Additionally, a webinar was organized by the Hawai'i Farm to School Hui to direct teachers to the curricular resources available for rat lungworm disease education and prevention. The webinar was held on May 7, 2019 and was attended by 25 participants. The webinar was recorded so it can be accessed by any educator at any time. The PowerPoint presentation is now viewable on the Hawai'i Farm to School website at <https://www.hiphi.org/farmtoschool/>.




**Engaging Students in Citizen Science**  
 Through the Prevention of **Rat Lungworm Disease**



**Summer 2019**  
**Free One-Day Workshops**  
**8:30am-3:30pm**

**Molokai: Monday, June 3**  
 UH Maui College Molokai Farm

**O'ahu: Wednesday, June 5**  
 UH West O'ahu, E133 LAB

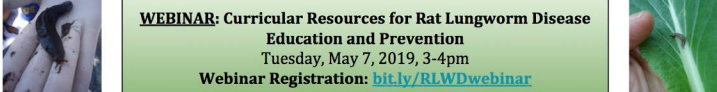
**Kaua'i: Thursday, June 6**  
 Kawaikini New Century PCS, Hale Akamai

**Maui: Friday, June 7**  
 Kalama Intermediate School, Room P-6

Participants will engage in hands-on STEAM activities designed to involve students of all ages in the prevention of rat lungworm disease (RLWD) through project-based learning. Workshop content is based on the new Rat Lungworm Disease Curriculum Manual developed by the University of Hawai'i at Hilo College of Pharmacy.

- Explore the rat lungworm life cycle and Integrated Pest Management (IPM) for control of slugs and snails.
- Use design thinking to build slug traps for school and home gardens.
- Learn how to set up a story map in ArcGIS.
- Receive your own printed copy of the Rat Lungworm Disease Curriculum Manual.

**Workshop Registration:** [bit.ly/RLWDworkshops](http://bit.ly/RLWDworkshops)



**WEBINAR: Curricular Resources for Rat Lungworm Disease Education and Prevention**  
 Tuesday, May 7, 2019, 3-4pm  
 Webinar Registration: [bit.ly/RLWDwebinar](http://bit.ly/RLWDwebinar)

Contact for more information:  
 Kay Howe: [kehaulhowe@gmail.com](mailto:kehaulhowe@gmail.com)  
 Lydi Bernal: [lydi@hiphi.org](mailto:lydi@hiphi.org)  
[www.farmtoschoolhui.org](http://www.farmtoschoolhui.org)



Hawai'i Association of Broadcasters

In 2017, DOH's Communications Office established a partnership with the Hawai'i Association of Broadcasters, Inc. (HAB) via its Public Education Program to develop and implement a statewide media broadcast education campaign about angiostrongyliasis. HAB guarantees sponsors a minimum three-to-one rate of return on their investments in paid broadcast airtime.

HAB leveraged its partnership with a local video production company to develop three 30-second television commercial spots and three 30-second radio commercial spots. They also contracted with participating television and radio stations to air the commercials with a scheduled run on a minimum of 40 radio and seven television stations statewide. The first leg of the campaign started in November 2017 and ran through June 2018. DOH renewed its agreement with HAB and a second year-long leg of the campaign is now on air, running from Jan. 1, 2019 through Dec. 31, 2019.



For more information:  
<http://health.hawaii.gov>



50 West Hawaii Today Hawaii Tribune Herald

**Three dead, hundreds injured**  
WUJIAN SHI/REUTERS  
A massive earthquake struck the island of Taiwan on Monday, killing three people and injuring hundreds. The quake, which measured 6.7 on the Richter scale, struck the island's east coast, near the city of Tainan. It was the strongest earthquake in eight decades to hit the island.

**Justice rejects BeB owner who denied room to lesbian couple**  
By Andrew Schoen  
A federal judge has rejected the argument of a woman who owned a rooming house that she should not be held liable for the death of a lesbian couple who stayed there. The woman, who had denied the couple access to the room, argued that she was not responsible for their deaths.

**US says 'agreement' on pipeline sale**  
By Andrew Schoen  
The U.S. State Department has announced that it has reached an agreement with the Chinese government regarding the sale of a pipeline. The agreement is expected to be finalized in the coming weeks.

**Source says Justice Department is probing development of Boeing jets**  
By Andrew Schoen  
A source has revealed that the Justice Department is investigating the development of Boeing jets. The investigation is focused on the company's financial practices and its relationship with the government.

Honolulu Star-Advertiser/Oahu Publications

DOH contracted with Oahu Publications to develop a multi-faceted media campaign to educate residents and visitors across the state about rat lungworm disease that includes print, online and digital billboard network advertisements. The campaign launched in January 2019 and ran through June 2019.

Print advertisements reminding the public of precautions to prevent contracting rat lungworm disease have been running in the Honolulu Star-Advertiser (O'ahu), MidWeek (O'ahu), West Hawaii Today (Hawai'i Island), Hawaii Tribune-Herald (Hawai'i Island) and The Garden Island (Kaua'i). Online advertisement in the form of banner ads as well as native ads (articles authored by the health department) are also running on the websites for these publications.

Video advertisements are also displayed on Oahu Publications' digital billboard network, which includes screens in O'ahu locations like Don Quijote, Jamba Juice, Longs Drugs stores, and Tamura's Grocery as well as Maui locations including Longs Drugs and Aloha Island Mini Mart.

**DIRTY SOFA? 25% DISCOUNT**  
Ed's Cleaning  
Kona 938-6915 Waimea 985-3332

**Hawaii Holistic Dentistry**  
David T. Dool DDS and Tawny Hartnett, DDS  
808-885-7144

**Enjoy Fresh Fruits and Vegetables Safely**  
Wash produce thoroughly and inspect food before eating.

**Great Finances**  
Consolidate Your Loans with HFS  
3.99% APR  
HFS

**JEEP FREEDOM DAYS**  
RENEGADE LATITUDE \$21,995  
COMPASS SPORT \$22,995

**Kamaaina Motors**  
400 E. Kawili St., Hilo  
935-3741

## News Media Promotion: Case Announcements

The health department consistently announces every laboratory-confirmed case of rat lungworm disease with an informative news release. This practice began in 2017 when more cases were confirmed than in previous years. Each news release explains the island where the individual may have been infected as well as how and when the individual may have gotten sick. Often, it is very difficult to identify the exact source of infection, but each release is tailored with related prevention guidance to the public.

All DOH news releases about case announcements or project developments (e.g. Joint Task Force clinical guidelines, community meetings, etc.) are well received and covered and by local media and often include in-depth interviews and advice on prevention. Department of Health staff and leadership, community experts from the Governor's Joint Task Force or the UH College of Tropical Agriculture and Human Resources have assisted in participating in news media interviews and providing critical guidance to the public. All news releases are posted online at <https://health.hawaii.gov/news/>.

## Social Media

Social media platforms provide an efficient and effective means of message delivery, and DOH leveraged both organic and paid opportunities.

Announcements of confirmed rat lungworm disease cases and community meeting schedules are included in DOH social media channels, including Facebook and Twitter.

## Social Media Advertising

In 2019, the health department allotted resources to "boosting" posts on its Facebook and Twitter accounts related to rat lungworm disease.

On Twitter, \$200 was used to boost a post that made 33,959 impressions from April 12 - 26. Hawai'i residents were the target of the campaign and included both followers and non-followers of the Department of Health on Twitter.

On Facebook, \$300 was used to boost a post that reached 29,823 people over 33 days. From March 31 through May 1, 2019, engagement resulted in 522 link clicks, 21,900 video views, 14 comments and 93 shares. Beyond the campaign, it gained even more traction. Hawai'i residents were the target of the campaign and included both those who did and did not already follow the Department of Health on Facebook.



HEALTH.HAWAII.GOV

**Prevent Rat Lungworm Disease** [Learn More](#)

**35,994** People Reached      **1,548** Engagements      [Boost Again](#)

👍🤔🙄 103      27 Comments 131 Shares

👍 Like      💬 Comment      ➦ Share

## Statewide survey reveals local food habits and risks

In November 2018, the Department of Health distributed a statewide survey to Hawai'i residents and visitors to learn more about food habits and find out if there are any behaviors associated with possible risks for foodborne illnesses, including angiostrongyliasis.

DOH's Disease Outbreak Control Division contracted Anthology Marketing Group in Honolulu to administer the survey. The survey team at Anthology Marketing Group was responsible for collecting completed surveys and aggregating the data to maintain respondent confidentiality. All responses were anonymous.

The survey included questions about what residents like to eat, where their foods are purchased or grown, where their water resources come from, and how their foods are prepared. Data gathered will be used to inform best practices for food safety, guide public health intervention and prevention strategies, and enhance understanding of the risk for foodborne disease among Hawai'i residents and visitors.

Exceeding our response rate goal, the department collected 4,482 survey responses. Obtaining this number of responses will better provide a comprehensive picture of household experiences in the state. The first year of the survey is complete and data are currently under review by epidemiological staff. Analyses are expected later this year.

A second wave of surveys was distributed to households statewide on July 3, 2019 to gain additional insight into how eating habits and home environments change depending on the time of year. Seasonality can introduce different food consumption habits and change environmental situations around the home. Both of these variables are important to understanding disease risk factors and guiding prevention methods.

The second round of surveys provides an additional data point. One data point provides a snapshot of that particular time only. Two points provide a better perspective. If additional funding is provided in the future, the survey could be administered again to provide multiple, regular points, which would be optimal to better define trends and routine practices.

Data gathered will be used specifically to analyze potential risk behaviors related to rat lungworm disease, such as specific food-item consumption, exposure to rats, slugs and

snails in the area surrounding a survey respondent's home, food preparation habits, water sources, and eating habits outside the home.

We know that most people get sick with angiostrongyliasis from eating infected slugs and snails, and disease investigators often have a difficult time pinpointing how people may unintentionally eat the infected mollusks. Survey findings will assist investigators in determining if certain behaviors or conditions may result in greater susceptibility than others to rat lungworm disease.

### Local News

## Health officials to conduct survey to better understand foodborne illnesses

By: Web Staff | Kimberlee Speakman

Posted: Nov 01, 2018 12:09 PM HST  
Updated: Nov 01, 2018 07:34 PM HST



In July 2019, a new epidemiological assessment was published in the *American Journal of Tropical Medicine and Hygiene* about an investigation by our DOH epidemiologists, which identified 82 reported cases of human infections of rat lungworm disease across the state over a 10-year period, between 2007 and 2017. The full article can be accessed online at <https://www.ajtmh.org/content/journals/10.4269/ajtmh.19-0280>.

Over the 10-year period, there was a median of seven cases per year, and the majority (57 percent) of cases occurred between January and April. Most (83 percent) cases were found on Hawai'i Island, with GIS analysis identifying hot spots on the east side of the island. However, cases were identified on the other major islands as well, suggesting the risk of exposure is present statewide.

Comparisons of cases from 2007 to 2017 with cases from previous assessments found no statistical differences in cerebrospinal fluid results, peripheral blood results, or ages of cases. However, differences in geographic distribution of the cases were statistically significant.

Authors found that improved testing and increasing awareness of the disease have contributed to our efforts to better understand the general risk factors and modes of transmission present in Hawai'i and also helped improve our prevention efforts. One of the gaps identified was that we still do not fully understand the specific causes of cases being concentrated in certain parts of the state over others, so further research is needed in this area.

## Vector Control

### Partnerships create research and training opportunities

In 2018, DOH's Vector Control Branch contracted experts from the University of Hawai'i at Mānoa and the Hawai'i Department of Agriculture to conduct staff training focused on snails and slugs of public health concern, their habitats and behaviors, methods of collection and trapping for testing for potential disease transmission to humans, and possible strategies to manage and abate them. There was a strong interest in *Angiostrongylus cantonensis* and its life cycle within rats and DOH personnel were also trained on live rodent trapping. Costs associated with this project were covered by DOH's Vector Control Branch and are separate from those initiatives funded by the legislative appropriation.

Led by Robert Cowie, Ph.D., graduate student Randi Rollins, and with participation of Matthew Medeiros, Ph.D., of UH Manoa's Pacific Biosciences Research Center, participants from DOH's vector control staff were trained to collect and identify slugs and snails. As a resource, Rollins, Medeiros and Cowie, developed a brochure that could be used for snail and slug identification and referenced by Vector Control Branch staff in future investigations. As part of this project, six collection sites were selected on O'ahu in areas with a range of wet to dry climates. Collection took place at each site between May 4 and July 13, 2019. Approximately 100 mollusks were collected at each site. Mollusks collected were then identified and screened for *A. cantonensis* by Rollins.







She organized a hands-on training session for DOH staff during which everyone learned how to extract DNA from a specimen and process it via PCR to detect the presence of *A. cantonensis* DNA. Based on the mollusks collected and screened during this training project, within each of the species collected, the larger the individual mollusk, the more likely it was to be infected with *A. cantonensis*. A correlation related to climate was also found. Mollusks collected in areas with higher rainfall were in general more likely to be infected with *A. cantonensis* than mollusks found in drier areas, although the details of this relationship differed among the species screened. Cowie and his colleagues are currently analyzing the data in more detail to confirm these conclusions, as well as investigating what makes some species of snails and slugs better carriers of rat lungworm than others. For official findings and updates, contact the Cowie Lab through <https://www.hawaii.edu/cowielab/>.



During the slug and snail collecting, vector control staff also conducted training activities around rodent trapping. Vector control staff participated in the trapping and identification of rats at the same six O'ahu locations used for mollusk sampling. Staff managed to trap 61 rodents, which included 44 adults, 15 subadults, and 2 neonates. Rodents collected during these activities were sent to the Hawai'i Department of Agriculture's Veterinary Laboratory for processing. Processed specimens have been sent to the Centers for Disease Control and Prevention laboratories and testing is ongoing to determine how many of the rodents were carrying the rat lungworm parasite, *A. cantonensis*.

## Moving Forward

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Although the period for dedicated funding from the Hawai'i State Legislature has ended, the Hawai'i Department of Health remains committed to continuing its efforts to increase public awareness about rat lungworm disease prevention and control.

Many legislators, especially those on Hawai'i Island have expressed community concerns about safely controlling slugs and snails on their own properties. The health department's Vector Control Branch is continuing its practice of responding to complaints, carrying out inspections, and providing education whenever possible.

Informing visitors to Hawai'i about the threat of rat lungworm disease, among other health risks unique to the islands, continues to be a challenge that the health department continues to address. While signage in local airports and popular tourist destinations is a good start, the department recognizes that efforts must continue and expand. Partnerships with the local visitor industry are critical to ensure that travelers to Hawai'i are prepared with the knowledge they need to enjoy their stay safely.

The Department of Health continues to host and participate in community meetings or offer presentations on rat lungworm disease to local groups as needed.

The health department will maintain and update informational resources, which will live on the Disease Outbreak Control Division's website. Regular prevention reminders to the public will be issued through news media materials as well as on social media, especially during rainy periods when disease vectors are likely to be more active than they are during drier months.