



TexMed 2016 Quality Research Abstract

Please complete all of the following sections.

Procedure and Selection Criteria

- Applicants should demonstrate an understanding of systematic investigation through research development, testing and evaluation designed to develop or contribute to generalizable knowledge. Judges will use the scoring described in this matrix to identify projects to be presented at the conference, as well as, projects to be considered for the awards.
- These submissions should provide general information related to the one of the following categories: patient safety, patient centered care, equity, timeliness, efficiency, or effectiveness.
- Maximum points delineated with a brief explanation of the content that should be included under each section. Applicants may describe the problem and results in narrative or graphic format.

PROJECT NAME: The Re-Emergence of Malaria, Yellow Fever and Dengue in Texas

Institution or Practice Name: Texas A&M University

Setting of Care: Williamson County and Cities Health District

Primary Author: Kathryn Watson

Secondary Author: A. Nelson Avery

Other Members of Project Team: [Click here to enter text.](#)

Is the Primary Author, Secondary Author or Member of Project Team a TMA member (required)?

Yes No

Please provide name(s): *Kathryn M. Watson*

Project Category: (Choose most appropriate category)

Patient Safety Patient Centered Care Timeliness
 Efficiency Effectiveness Equity

For this poster session, TMA is looking for projects that demonstrate the six aspects of Quality Care as defined by the Institute of Medicine.

- Safe - avoids injuries to patients from care that is intended to help them
- Timely - reduces waits and delays for both those who receive care and those who give care
- Effective - based on scientific knowledge, extended to all likely to benefit, while avoiding underuse and overuse
- Equitable - provides consistent quality, without regard to personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status
- Efficient - avoids waste, including waste of equipment, supplies, ideas, and energy
- Patient centered - respects and responds to individual patient preferences, needs, and values, ensuring that patient values guide all clinical decisions

Quality Research

Introduction (15 points max): Describe 1) where the work was completed; 2) what faculty/staff/patient groups were involved, and 3) sufficient background information provided to establish the significance of the problem.

More than 600,000 people worldwide die each year from malaria, yellow fever or dengue. With so many people impacted by these mosquito-borne diseases there has been raised concern that these diseases could re-emerge in the United States. The purpose of this research is to review the epidemiologic evidence and reported cases that may indicate the re-emergence of malaria, yellow fever and dengue in the state of Texas and specifically within Williamson County, TX, as well as examine the current integrated pest management program endorsed by national and state agencies and compare it with local mosquito control efforts adopted by Williamson County and Cities Health Department. We reviewed mosquito-borne disease data available on Williamson County Texas citizens to look for upward trends in malaria, yellow fever and dengue and also reviewed the county's local mosquito control efforts to determine if they were proving effective in controlling disease outbreaks and also to see what changes need to be made in order to better keep these diseases at bay.

Hypothesis (15 points max): State the pertinent research or change hypothesis. Using if/then format, describe the 1) assumption; 2) condition; and 3) prediction(s).

If the mosquito vectors for malaria, yellow fever and dengue are present in the state of Texas then it is possible that malaria, yellow fever and dengue have returned to Texas and any cases of these diseases should be documented by local and state health authorities and the trend should show an increase in incidence of these diseases within Williamson County as well as the state of Texas due to citizen travel and globalization.

Methods (25 points max): Describe the specific methods, resources, procedures, models and/or programs used to study and test the subject of the investigation. Note charts, graphs and tables here and send as addendum with abstract form.

Methods included an extensive literature review on malaria, yellow fever and dengue in the United States as well as an interview with a medical entomologist who works for the Williamson County and Cities Health District (WCCHD) who provided data regarding the presence of malaria, yellow fever and dengue in Williamson County within the past twenty years. For the state of Texas, this study's data came from scientific journal articles written in the past twenty years that addressed these three mosquito-borne diseases re-emergence within the state and included articles from the Texas Medicine Magazine, a publication of the Texas Medical Association, who documents new cases of these vector-borne diseases in Texas, the CDC, Texas DSHS and the American Mosquito Control Association.

Results (25 points max): Specifically explain what was discovered, accomplished, collected and/or produced; supports hypothesis and conclusions with adequate evidence and includes quantitative data. Note charts, graphs and tables here and send as addendum with abstract form.

Results showed that although malaria was eradicated in the early 1950s, the mosquito vector is still present in the US and as a result, autochthonous malaria cases have been reported in Texas since 1970. In 2012 there were 110 imported cases of malaria in Texas, which provides a human source that could lead to the endemic return of malaria in Texas. Although no cases were reported in Williamson County the threat of its re-emergence is high given the amount of travel conducted by citizens in this county to countries within Africa where malaria is present. Yellow Fever (YF) was eradicated in 1905 however the *Aedes aegypti* mosquito remains present in the state of Texas and as a result of travel to countries with endemic YF, imported cases of YF have been reported. In 2002, one fatal case of imported YF was diagnosed in TX, which leads to the possibility that future imported cases could bring about the return of this dreaded disease to Texas. Although no cases were reported in Williamson County, the frequency of travel promotes imported cases leading to autochthonous cases. Furthermore, Texas is at real threat from dengue with 16 autochthonous cases being

reported in 2013 and regular imported and autochthonous cases documented in Texas since 1980. In Williamson County there were three cases of dengue reported from 2003-2012 and with 21 cases reported in its southern border's Travis County, the risk for re-emergence of dengue is quite high. Local health districts perform mosquito management in Texas with assistance from state and national agencies. These health districts follow the integrated pest management program (IPM), which includes trapping mosquitoes, testing for arboviruses, recording results, implementing biological controls and chemical treatments when necessary and educating the public. This program has significantly contributed to lowering the risk for re-emergence due to its extensive testing and active surveillance. Areas for improvement to prevent the re-emergence of these diseases included: prioritizing education of healthcare providers in identifying cases of malaria, YF and dengue, identifying factors at the local level that contribute to re-emergence, continue strengthening active and passive surveillance, support vaccine development and utilize new scientific techniques to render mosquito vector's non-competent.

Conclusions (20 points max): *Provide a succinct interpretation of the results and evaluate what the results mean to the investigation, OR evaluate the relevance or uniqueness of what was accomplished in the immediate context of the project's purpose and describe how the investigation fits within a larger field.*

In conclusion, the re-emergence of malaria, yellow fever and dengue in TX is a strong possibility given the presence of the disease-carrying mosquito vectors and the number of imported cases that occur annually. Through integrated pest management program, Williamson County has kept malaria and yellow fever at bay, however there has been a rise in dengue fever in the past twenty years. Therefore increased surveillance and preventive measures need to be implemented to ensure these diseases never again become endemic in the United States.

Table 1: Texas autochthonous malaria cases⁸

Year	Texas County	# of cases	Type of Malaria
1970	Kendall County	2 cases	<i>P. vivax</i>
1971	Medina County	1 case	<i>P. vivax</i>
1985	Dallas County	1 case	<i>P. vivax</i>
1994	Harris County	3 cases	<i>P. vivax</i>



Figure 8: Distribution of dengue fever outbreaks and *A. aegypti* in the US¹⁸

Table 2: Texas autochthonous Dengue cases¹⁹

1980-The first autochthonous case of dengue reported in the US since 1945 occurred in Brownsville, TX from a 5 year old girl with no history of travel outside Brownsville

1966-9 individuals reported autochthonous transmission in seven Texas counties: Bee, Cameron, Hidalgo, Maverick, Nueces, Travis and Webb

1999-Laredo, Texas reported 2 autochthonous cases

2005-woman developed autochthonous DHF in TX
2005-3 locally acquired cases in Brownsville, TX

2013-16 cases of locally acquired dengue reported

Figure 3: US Malaria Incidence by year 1997–2011⁷

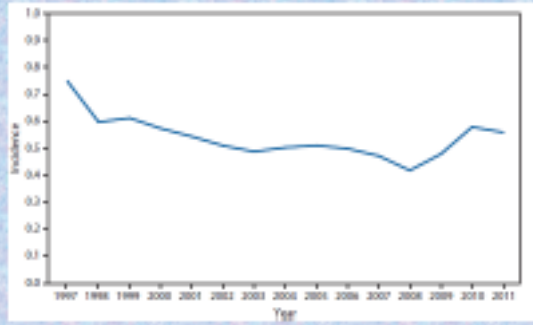
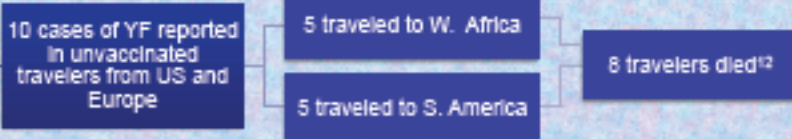


Figure 1: Number of malaria cases, by state in which the disease was diagnosed — US, 2012⁸



1970-2013



Imported Case to Texas:
 March 2002 a 47 y/o male returns to Texas from Brazil & developed signs and symptoms of YF; later diagnosed with YF and died from the disease.¹⁴

Figure 7: Integrated Pest Management¹⁵

