

## Short Communication

# Identifying Health Disparities of Mosquito-Borne Diseases in Low and Medium Income Communities in Savannah, Georgia, USA

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## Abstract

Because poor communities are often at higher risk of vector-borne diseases a survey in the city of Savannah, Chatham County, Georgia, USA, was conducted to determine if variation occurred between poor and medium income communities in behavior, knowledge of mosquitoes and governmental mosquito control services. Significant differences were found in personal protective measures and concern of mosquito-borne diseases. Suggestions are provided in order for public health officials and mosquito control departments to better inform the population and to assist in integrated mosquito management to alleviate health disparities of mosquito-borne diseases. Community surveys can play a critical role in the success of reducing the risk of mosquitoes and mosquito-borne diseases when incorporated into the integrated vector management plan.

## INTRODUCTION

Poverty can play a major role in determining whether a person is at risk of infectious disease, including mosquito-borne diseases [1]. Residents in Baltimore, Maryland USA were at higher risk of exposure to the principal vector of WNV, *Culex pipiens* [2]. West Nile virus (WNV) was first detected in the city of Savannah and Chatham County, Georgia, USA in 2002 [3]. In 2013, the Centers for Disease Control and Prevention stated, "CDC and its partners work to identify and address the factors that lead to health disparities among racial, ethnic, geographic, socioeconomic, and other groups so that barriers to health equity can be removed. The first step in this process is to shine a bright light on the problems to be solved" [4].

A recent analysis of demographic factors contributing to the risk of WNV in Savannah and Chatham County has shown that people living in poor and minority neighborhoods are at higher risk of WNV while being less likely to call and receive assistance from the Chatham County Mosquito Control Department (CCMC) than those living in wealthier communities [5]. As a consequence of the demographic study, it was determined that additional information from communities was needed in order to help address these health disparities. Community surveys are conducted to provide data that public health professionals can use to assist in planning and optimizing mosquito control efforts [6-

11]. According to CCMC staff, there have been no comprehensive community surveys of citizens to determine knowledge of vector control in Savannah. This paper discusses the results of a recent survey of citizens in Savannah to determine whether there was a difference in knowledge level concerning mosquitoes, self-protection and CCMC services between low and medium income families.

## METHODS

A door to door survey was conducted from May through August, 2016 in Savannah, located in Chatham County, Georgia, USA. Only citizens above 18 were questioned, names and addresses are unrevealed to protect the anonymity of survey participants. The source of income data is the U.S. Census Bureau [12]. Median family incomes in neighborhoods ranged from \$18,100 USD to \$50,368. Data was analyzed by ANOVA with Fisher's exact test using Statistica® software. The questions of the "CHATHAM COUNTY MOSCON NEIGHBORHOOD ANONYMOUS SURVEY" were answered with a No=0, Yes=1 or on a scale of 1 to 4 as below:

1. Have you received information on how to do mosquito control from Chatham County, community events, newspaper articles or radio?
2. Are you aware of mosquito control services provided by

Chatham County?

3. Have you ever visited the Chatham County Mosquito Control webpage?

4. Which mosquito prevention measures do you use?

A. Repellent

B. Long sleeves and long pants

C. Avoid being out at dusk or after dark because of mosquitoes

D. Change water in bird bath each week or empty rain water from containers in yard

5. On a scale of 1 (least severe) to 4 (most severe), how severe are the mosquitoes around your home?

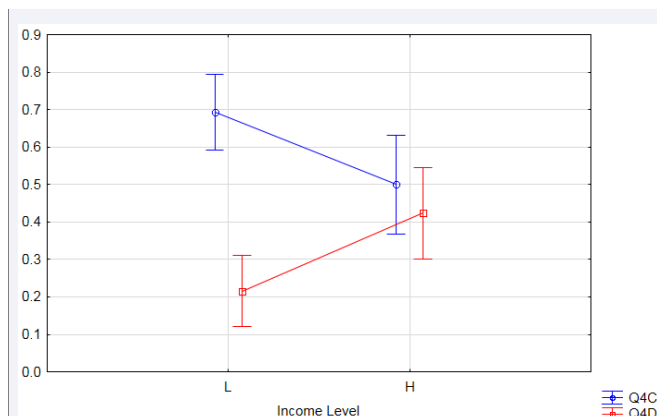
6. On a scale of 1 (least concerned) to 4 (most concerned), how concerned are you with diseases that mosquitoes may carry

## RESULTS AND DISCUSSION

One hundred and forty citizens in Savannah were interviewed. There were significant differences between lower and higher income communities. Those citizens living in low income communities were significantly more likely to avoid mosquitoes by not coming out during dusk or evening compared to higher income communities (Question 4C:  $\bar{x} = 0.69$  vs  $0.50$ ,  $p < 0.05$ ,  $MS = 0.23$ ) but less likely to reduce breeding sources in their yard (Question 4D:  $\bar{x} = 0.22$  vs  $0.42$ ,  $p < 0.05$ ,  $MS = 0.20$ ) (Figure 1). Citizens living in communities with a median income below \$34,000 perceived mosquitoes to be more severe around their homes than? (Q5:  $\bar{x} = 2.7$  vs  $2.3$ ,  $p < 0.05$ ,  $MS = 0.95$ ). They were also significantly more worried about mosquito-borne diseases than those living in neighborhoods with higher incomes (Question 6:  $\bar{x} = 3.4$  vs  $2.8$ ,  $p < 0.05$ ,  $MS = 1.1$ ) (Figure 2). Although not recorded as a variable in the survey, individuals living in poorer communities were generally less likely to know they could call and receive support from CCMC should they have a mosquito problem. This conclusion is supported by a previous study in Florida [5,6] where citizens in wealthy neighborhoods were more likely to call and receive support from CCMC than those living in poor neighborhoods

Additional conclusions of behavior and understanding of citizens living in poor and medium income communities can be drawn from the survey (Table 1). In general, citizens in Savannah did not receive information on how to control mosquitoes from media sources. The CCMC web page was also not effective in delivering information to individuals, with only about 4% being aware there was a web page. A large number of people in Savannah used mosquito repellent to protect themselves from mosquitoes and slightly over half wear long sleeves and long pants, despite the heat and humidity of Savannah during mosquito season. The lower the income the higher the response rate indicating that mosquitoes were severe around their home. In general citizens were more than moderately concerned about the diseases that mosquitoes transmit; however, some citizens were only slightly concerned while others were severely concerned, this being negatively correlated to income.

In addition to WNV, there is a risk of introduction of Zika virus infected mosquitoes through air and maritime ports in Savannah and Chatham County, where poor and minority neighborhoods



**Figure 1** Significant differences occurred between surveyed individuals in personal protective behavior in neighborhoods with median incomes below \$34,000 (L) and those living in neighborhood with median incomes above \$34,000 (H) using ANOVA with Fisher's exact test. (LS Means Wilks lambda=0.92,  $F(2,137) = 6.08$ ,  $p = 0.003$ , vertical bars denote 0.95 CI).

**Table 1:** Results of Descriptive Statistics Chatham Neighborhood Survey.

Variable	N	Mean	Sum	Min	Max	Std. Dev.
Q1	140	0.29	41	0	1	0.46
Q2	140	0.44	62	0	1	0.59
Q3	140	0.04	5	0	1	0.19
Q4A	140	0.84	117	0	1	0.37
Q4B	140	0.59	83	0	1	0.49
Q4C	140	0.62	87	0	1	0.49
Q4D	140	0.29	41	0	1	0.46
Q5	140	2.55	356	1	4	0.99
Q6	140	3.13	438	1	4	1.10

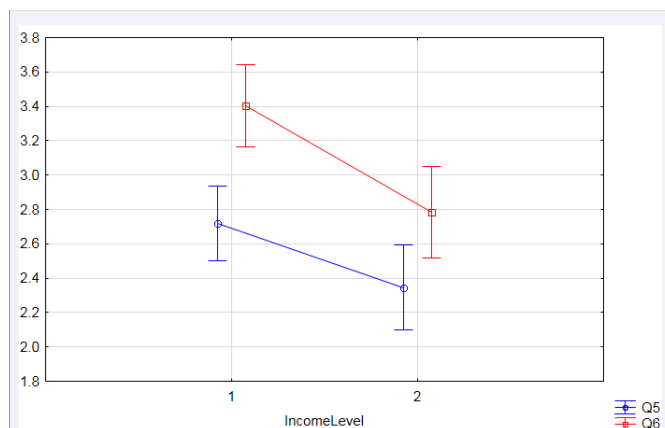
may be at higher risk [13]. Steps have been taken to expand education of the public by public health officials in Georgia in order to encourage home owners to eliminate mosquito breeding sites around their homes through news releases containing the catch phrase "Tip and Toss." [14]. The following recommendations are provided to improve education and improve planning to reduce health disparities in Savannah and Chatham County:

1) Include periodic community surveys as part of active surveillance by Chatham County Mosquito Control;

2) Expand outreach in poor and minority neighborhoods using social media, community events, and door to door visits and rely less on the web page as a primary means of reaching the public; and

3) Key areas for education include: letting people know the current threat of mosquito-borne diseases, the importance of source reduction around home (possibly adopting enforcement measures), and informing citizens to call Chatham County Mosquito Control services when needed.

Biological and environmental effects, local mosquito control practices, policies, geographic-based economics, and cultural factors can shape the spread of mosquito-borne diseases [15]. Community surveys are an effective tool for public health officials



**Figure 2** Significant differences occurred between surveyed individuals in homes with median incomes below \$30,000 (1) and those above \$30,000 (2) using ANOVA with Fisher's exact test. (LS Means Wilks lambda=.90881, F (2, 137) =6.8731, p=.00143 (Vertical bars denote 0.95 CI)

to gain insight into the communities they are charged to protect. For example, in North Carolina, survey results indicated that education and outreach are necessary for effective planning of mosquito control [16]. However, introducing new ideas and methods into a bureaucratic organization can be difficult [17]; this may result in the stifling of initiative and reducing flexibility and adaptation to new challenges. For example, despite evidence of higher risk of mosquitoes and mosquito-borne diseases in poor and minority neighborhoods, mosquito control organizations can fail to adopt methods and technologies to alleviate these health disparities [5]. In addition to failing to alleviate health disparities, failure to adopt evidence based methods can result in poor decision making, increased costs, reduced contamination of the environment by misapplication of pesticides, and errors in the release of public health information to the media. Identifying strengths and weaknesses in communities concerning knowledge of the citizens and support by government authorities is critical. Public health officials, mosquito control agencies, news media and communities should work hand in hand and in an honest dialogue to build trust, increase efficiency and reduce health disparities and risk to mosquito-borne pathogens in vulnerable communities. Community surveys can play a critical role in the success of reducing the risk of mosquitoes and mosquito-borne diseases when incorporated into the integrated vector management plan.

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## REFERENCES

- Hotez PJ, Murray KO, Buekens P. The Gulf Coast: A New American Underbelly of Tropical Diseases and Poverty. *PLOS Neg Trop Dis*. 2014; 8: 1-3.
- LaDeau SL, Leisnham PT, Biehler D, Bodner D. Higher Mosquito Production in Low-Income Neighborhoods of Baltimore and Washington, DC: Understanding Ecological Drivers and Mosquito-Borne Disease Risk in Temperate Cities. *Int J Env Res Pub Hlth*. 2013; 10: 1505-1526.
- Moulis RA, Lewandowski HB, Russell JD, Heusel JF, FAW Peaty LFAW, Mead DG, et al. West Nile virus activity in Chatham County, Georgia during 2011. *Wing Beats*. 2012; 24: 23-27.
- Centers for Disease Control and Prevention. Health Disparities & Inequalities Report - United States. 2013.
- Kollars TM. Identifying high risk areas of West Nile Virus in minority and low-income neighborhoods. *Clin Micro Inf Dis*. 2017.
- Weaver JH, Phillips JD, Gaines MK, Xue R. Analysis of Anastasia Mosquito Control District's Service Requests. *Wing Beats*. 2013; 24: 34-40.
- Hairi F, Ong CH, Suhaimi A, Tsung TW, bin Anis Ahmad MA. A knowledge, attitude and practices (KAP) study on dengue among selected rural communities in the Kuala Kangsar district. *Asia-Pac J Pub Hlth/Asia-Pac Acad Consort Pub Hlth*. 2003; 5: 37-43.
- Hlongwana KW, Mabaso ML, Kunene S, Govender D, Maharaj R. Community knowledge, attitudes and practices (KAP) on malaria in Swaziland: A country earmarked for malaria elimination. *Mala J*. 2009.
- Kaul SM, Verma AK, Jain DC, Gupta RS, Dutta A. Community perception of mosquitos and mosquito control in some areas of urban Delhi and rural Alwar, Rajasthan. *J Commun Dis*. 1995; 27: 215-222.
- Liu X, Wan F, Cirendunzhu, Cirenwangla, Li Bai, Pengcuociren, et al. Community Knowledge and Experience of Mosquitoes and Personal Prevention and Control Practices in Lhasa, Tibet. *Intl J Env Res Pub Hlth*. 2014; 11: 9919-9937.
- Wilder-Smith A, Khairullah NS, Song JH, Chen CY, Torresi J. Travel health knowledge, attitudes and practices among Australasian travelers. *J Travel Med*. 2004; 11: 9-15.
- US Census Bureau. Quick Facts Table. 2016.
- Kollars TM. Identification of arbovirus surveillance sites at maritime and airports to reduce the risk of export of Eastern Equine Encephalitis and import of Zika viruses into coastal Georgia. *J Dent Med Sci*. 2016; 15: 87-90.
- Georgia Coastal Health District. Residents Encouraged to Tip 'n Toss to Prevent Mosquitoes. 2016.
- Tedesco C, Ruiz M, McLafferty S. Mosquito politics: Local vector control policies and the spread of West Nile Virus in the Chicago region. *Health Place*. 2010; 16: 1188-1195.
- Grantham G, Anderson AL, Kelley T. *Int J Env Res Pub Hlth*. 6: 2150-2159.
- Steiner C. A role for individuality and mystery in managing change. *J Org Chg Mgmt*. 2001; 14: 150-167.

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