

# Field Notes

---

AN INTERDISCIPLINARY MALARIA EDUCATION PROGRAM	28
MEDICAL NEUTRALITY AND SOLIDARITY IN THE SYRIAN ARMED CONFLICT	33
TUBERCULOSIS IN ZULU POPULATIONS	37

## “Anansi tricks Mrs. Mosquito”

An interdisciplinary malaria education program for school aged children in Kwahu-East District, Ghana

*Deborah Lardner, DO, DTM&H, Michael Passafaro, DO, DTM&H, Jonathan Giordano, MS IV, Jasmine Beria MPH, MS IV  
New York Institute of Technology (NYIT), Center for Global Health, New York, NY, USA*

---

### Abstract

Malaria, although a preventable infectious disease, still has negative long-term economic and social consequences on the lives of children in developing nations. This project describes the creation of an educational intervention based on West African folktales designed to increase awareness regarding the vector, the signs and symptoms and the prevention of malaria in the Kwahu-East district, Ghana. An interdisciplinary approach was instrumental for the creation of the play “Anansi tricks Mrs. Mosquito.” Using Anansi the spider, an established folk character, as the protagonist, the interactive play was performed at local schools and community health clinics during June, 2012. The educational content was reinforced by a question and answer session and the distribution of an illustrated book at the end of the performance. Field reports indicated that the children were consistently engaged and able to recognize and identify with the characters. After the performance, they had immediate recall of the signs and symptoms of malaria, the disease vector and prevention by the use of bed nets. The books were also used as teaching tools in some classrooms. This deceptively simple twenty-minute performance was created over a period of several months in order to be implemented in the field. By combining local talents from a number of specialties—education, medicine and visual arts—the authors were able to create a culturally appropriate model for the creation of this malaria prevention tool that could be expanded to address a number of diverse backgrounds and disease burdens.

---

### Introduction

Since the discovery of malaria by Sir Ronald Ross in 1897, extensive research has been conducted about the Plasmodium parasite, the vector as the Anopheles mosquito, its life cycle and the transmission process of the disease.<sup>1</sup> However, there is still a need for ongoing malaria education and prevention in endemic areas such as Africa. Globally, malaria still causes approximately 655,000 deaths per year. In 2010 alone, an estimated 216 million new cases arose.<sup>2</sup> Malaria remains one of the top three killers of preventable infectious diseases.<sup>3,4</sup> This paper describes our experience in malaria education in West Africa, and proposes a low cost, low technology model that could be expanded into other countries.

Malaria continues to be a leading cause of mortality, particularly in the rural regions of Africa where medical resources are scarce,<sup>2</sup> and the symptoms of the disease significantly interfere with daily living activities. It contributes to the vicious cycle of missed educational opportunities through poor school attendance, leading to increased poverty, shortened life expectancy and disability. These

economic consequences of living in endemic areas have been measured in Disability Adjusted Life Years (DALYs), where in 2002, the total global burden of disease from malaria was estimated by World Health Organization (WHO) to be over 46 million DALYs lost,<sup>5</sup> and in Africa 15% of all DALYs.<sup>6</sup> This makes it the fourth most costly disease burden in Africa.<sup>7</sup>

In his review of economic and social burden of malaria, Jeffrey Sachs, economist and renowned scholar on sustainable development, notes, “where malaria prospers most, human societies have prospered least.”<sup>4</sup> The unequal distribution of malaria means the world’s most impoverished populations are twice hindered by disease burden and economic disadvantage, both impeding development. The Center for Disease Control (CDC) estimated the direct costs of treating the disease to be over ten billion dollars per year,<sup>8</sup> with indirect costs to governments, including maintenance and stocking of health facilities, public health education, insecticide spraying and distribution of insecticide-treated bed nets (ITN) equally significant. Even more striking are the long term consequences, which



*Courtesy of the Author*

have been demonstrated to decrease economic growth of a country's Gross Domestic Product (GDP) in highly endemic countries,<sup>9,10</sup> and works against poverty eradication efforts.<sup>11</sup>

The United Nations Millennium Development Goal, Target 6.C was created to reverse the incidence of malaria and other major diseases by 2015.<sup>12</sup> This global commitment has resulted in an estimated decrease of the incidence of malaria by 17%, and a 26% decrease in mortality rate from 2000 to 2010.<sup>2</sup> The success was due in part to an aggressive prevention program sponsored by the World Bank and Roll Back Malaria Partners in which nearly 100 million ITN were distributed in African countries from 2006 to 2012.<sup>13</sup> Experts consider this intervention to be the simplest and most cost effective prevention strategy in developing countries, as it requires no significant upkeep or interventions other than behavioral changes. Nonetheless, many bed net control policies have mistakenly overlooked community perceptions and attitudes that can have a substantial role in behaviors affecting malaria transmission, recognition and treatment.<sup>14</sup>

Our project was conducted in Ghana, where malaria accounts for 9% of overall country mortality and 40% of all malaria deaths occur in children under the age of five.<sup>15</sup> Although many Ghanaians are well informed about the classical symptoms of malaria, the understanding of malarial transmission in rural communities may be clouded. These community misconceptions can result in behaviors that contribute to increased vector exposure. For example, several articles describe community beliefs that heat from the sun was a cause of malaria. Other misconceptions were that overworking during the day or stagnant water itself could cause malaria.<sup>14,15,16</sup> The use of bed nets was therefore inconsequential. Adongo et al. investigated community knowledge about malaria and ITN use in Ghana and concluded that interventions require more social and behavioral research in order to explain the influence of local beliefs. More specifically, bed nets were perceived as mere "nuisance reducers"<sup>17</sup> rather than a preventive measure.

Community misconceptions can result in behaviors that contribute to increased vector exposure.

This resulted in bed net use by adults rather than children, since adults required a superior sleeping environment to function better during the following workday.

## Background

The Center for Global Health at The New York Institute of Technology (NYIT) headed this interdisciplinary educational intervention. The Center, established in 2007, is a collaborative effort between a variety of schools and colleges within the University system. Each specialty is invited to contribute to the sustainable improvement of healthcare in host countries. Part of the Center's mission statement includes collaborative international teaching, research and service. Partnering with a non-governmental organization (NGO), The Jesse Rohde Foundation, in a small community of Oworobong, Ghana, we conducted a background research project entitled "School Age Children's Attitudes and Perceptions of Hygiene and Transmission of Infectious Disease in Rural Ghana."

With permission from our Institutional Review Board (IRB), a consultant from the Noguchi Memorial Institute for medical research at the University of Accra and the local Ministry of Health official, a preliminary medical record review at the Oworobong Health clinic for the period from January 2011 to July 2011 was conducted. A total of 1027 medical records were reviewed. Of the 453 cases of malaria diagnosed, 64.2% (n=291) were children 18 years of age or less. Although a small community health clinic serves the area, its remoteness complicated immediate follow-up for severe malaria cases including cerebral malaria, severe anemia, acute renal failure or respiratory distress syndrome.

## Project Description

Our goal was to develop a simple, concise message that would increase the use of bed nets by adults and children, thereby decreasing vector contact. The community health clinic on Oworobong also serviced a number of surrounding agrarian villages (Awesasu, Ohema, Miasu and Oframase); therefore our intervention needed to be general enough that it could apply to a number of localities.

Since the target community is isolated with limited resources including a lack of electricity and reliable phone service, the proposed program design would have to be self-contained and adaptive. It could not rely on technical or electronic equipment that might not function in environmental conditions of extreme heat or high humidity. Furthermore, it would need to be culturally appropriate, use recognized characteristics of the community and trigger discussion among different age groups. There is a high level of both adult and youth illiteracy in several of these communities; therefore our method could not require extensive amounts of reading to convey the message. Based on the above community requirements and resources, the most effective intervention was in the form of "edutainment,"<sup>18</sup> that could be offered through the health clinic. It was decided that an animated story or "play" that encouraged the use of bed nets as malaria prevention would reach the largest number of community members. Specifically, we targeted school aged children and their parents re-

garding malaria recognition, transmission and prevention.

## Background research

A multidisciplinary team approach was taken to develop this educational programming between the NYIT faculty from the College of Medicine, the Center for Global Health, School of Education, the university librarians, the partnering NGO and a local New York artist. Multiple brainstorming meetings were conducted over a period of months. Since there often existed a language barrier with the target audience on the ground, it was decided that a single narrator with the assistance of a translator would be the most effective tool. It was then agreed that lightweight puppets would be the most effective means of animating the story, since they could be carried across difficult terrain in order to reach more remote sites and could be used either day or night depending on how they were illuminated.

## Artistic design and cost

With the help of the artist, materials were chosen that were durable, lightweight and portable. Supplies were purchased from local art supply stores or larger home improvement stores where materials could be repurposed for the project. The vibrant African-design based puppets served as the characters on a mobile backdrop—a painted fabric set that could be easily displayed and transported. The artist also created foam shadow puppets that could be illuminated from behind at night with flashlights as well as brightly painted thin flat wooden puppets that would be better seen during the day.

To further reinforce the educational objectives, an illustrated book, “Anansi Tricks Mrs. Mosquito” published by the NYIT Publications and Advertising Office, was distributed to the children at the end of the performance to emphasize the learning objectives. Although English is the official language of education in Ghana, it is not always used in rural communities. Accordingly, the books were printed in English but targeted to early readers. Another artist completed the book illustrations based on the puppets and photographs of the target area.

The authors believe this project is unique because of the low cost in conveying our educational objectives thereby increasing the potential for wider distribution. The cost of supplies for the educational component of this pilot project was minimal (less than \$500 USD). Costs included artistic supplies, paints, backdrop, etc. The cost of the illustrated paperback book production was covered by the university Publication and Advertising Office (approximately \$1500 USD). Professional services by the artists for this project were given gratis. If similar projects were to be repeated, these professional artistic services would need to be appropriately compensated, as the design requirements for the field conditions were important.

## Character selection and story creation

Research conducted by the university librarians and School of Education team resulted in the choice of Anansi, a recognizable character in the region of West Africa, as the protagonist. Anansi tales are some of the best-known in West Africa specifically among the Ashanti culture, where they were carried down through the generations by storytelling.<sup>19</sup> In these folktales, also known as Anansesem or “spider tales” in the Ashanti language, Anansi is usually portrayed as a trickster who often gets into and subsequently out of trouble.

Based on physician input of the malaria-causing plasmodium life cycle, a storyline and later script was created that emphasized means of transmission, signs and symptoms and prevention of malaria by the correct use of bed nets. Project members who had firsthand knowledge of the target communities contributed culturally appropriate details for the play, including names and everyday events in the play, such as market days and the name of the local clinic. Even the name of the mosquito, locally known as a tum-tum, was considered. The language in the book is simplistic and formal in order to encourage adults with poor reading skills to practice with their children thereby reinforcing the learning objectives.

## Excerpts from the story

The antagonist, Tammy Tum Tum, the mosquito, enters the village and bites the children who then get ill. The local nurse emphasizes the signs and symptoms of malaria to the mother before the children become ill by visiting the home.

“Welcome, Akwaba!” Anna calls out.

“Hello, I am going from home to home today to let mothers know that we have had several malaria cases in the area. I wanted to make sure that you were aware of all of the signs and symptoms.”

“Well,” Anna says, “I know that the main symptom is when you get very hot, your bones hurt.”

“Right,” Nurse Mary says, “it is caused by being bitten by a mosquito. Many pesky bugs fly around, but the mosquitoes that come out at dusk and when we are sleeping are most worrisome. It is very important that you come to the clinic as soon as anyone in your family is feeling sick. The malaria in this region of Ghana is very dangerous.”

“Thank you for stopping by,” Anna says, “I will remember. Goodbye.”

To target younger children, the plot uses traditional elements of folk tales that include fantasy in the form of talking animal characters. A classical epic battle between the protagonist and antagonist where Anansi is victorious occurs and often engages slightly older children.

Later that night, the whole family gets ready for bed and goes to sleep. Anansi spins a web, climbs to the center of it, and falls asleep. In the other corner of the room, Tammy Tum Tum buzzes in.

Anansi startled, awakens from the noise. He sees Tammy hovering over Sarah, and Anansi reacts, quickly spinning a web over Sarah to protect her. Tammy Tum Tum sees Anansi’s protective web over Sarah, rapidly changes directions, and heads for Ralph. Anansi reacts swiftly, jumps over to where Ralph is sleeping, and spins a web as fast as he can. Just then, Tammy Tum Tum gets to Ralph, sees the web and backs away!....

“Tammy, you hurt too many people!” Anansi explains. “You need to get out of here! Get out of this village, or I will have all the children hit you when they see you!”

Tammy furiously flies toward Anansi, who weaves another web, and Tammy gets caught in it. Anansi jumps to get Tammy, who struggling successfully frees herself, and flies away, far away from the village!

The end of the story uses nature and the metaphor of the spider’s web to remind people of the importance of bed nets.

“The next night, the family is at dinner. Just then, father comes over and points toward the corner of the wall. He asks, “Mother do you SEE THAT?”

The whole family stares in the corner and sees a spider’s web.

“There is a hidden message written out in the spider’s web,” says father Benjamin. “It reminds us that we must protect ourselves from the mosquitoes. So every time we see a web, remember what Anansi did for us, and how we must continue to fight off Tammy Tum Tum, by using our mosquito nets every night.”

“Anansi made these web nets to protect all of us! We will use them every day to prevent our family from getting malaria!” Mother Anna exclaims.

## Field implementation

The interactive play was performed in five villages with approximately 150 children in attendance at each performance. Students and faculty from the Center performed the play in English, Twi and other local dialects with the assistance of trained translators. The play was performed by medical students as part of a field research curriculum, but could easily be taught to community members, as the performers required little more than a backdrop, puppets and a single narrator/translator. Daytime performances were usually conducted in the schools of the surrounding villages and evening performances were conducted at the health clinic.

Following each performance, a question and answer session was conducted when the children were asked to recall the above stated objectives. As the parents were also in the audience, the discussion often included questions about medical treatment and bed



*Courtesy of the Author*

net availability. The project team felt it was important to provide the means as well as the knowledge for malaria prevention. To that end, we were able to procure a donation from an international bed net company who generously provided ITN for the community. The nets were distributed to a number of schools at the conclusion of the performance. Since data has indicated a significant drop (up to 75%) in bed net ownership when even minimal payment or cost sharing of ITN was required when compared to free distribution,<sup>20</sup> the nets were provided free of charge to those in the community who did not have one. Community leaders and teachers were responsible for distributing bed nets, as they were most aware of the individual situation.

## Discussion

It has been demonstrated that early intervention for health and hygiene can make a significant difference in disease transmission.<sup>21</sup> The reinforcement of healthy habits in childhood can result in permanent changes as children age. Examples of this can be found in the literature related to hand washing<sup>22,23,24</sup> It has also been repeatedly demonstrated that children, once educated about the issue, will go on to educate other members of the family and community.<sup>25,26,27,28</sup>

Using this model, our goal was to create a malaria health intervention that targeted children so they could grasp the learning objectives, and emphasize healthy behaviors that could be used in the home.

The children were consistently engaged in the play and were able to recognize and relate to the characters. A local teacher who was interviewed on camera after witnessing the performance said, "I liked the analogy between the spider webs and the nets. One thing that really helped is that the children are familiar with the spider webs so it helped them to get the understanding very quickly. The interpretation was done very well and they were able to get all the necessary information from the play. Overall it was very impressive." Children demonstrated immediate recall of the signs and symptoms of malaria, the disease vector as the mosquito and the prevention of malaria by the use of a bed net after the presentation, and the publications were reported to be teaching tools in some

classrooms.

We were able to engage with other community members through this project. Health providers, educators and community leaders were often present at the play, which served as a catalyst for discussion about malaria prevention at home and in schools. Their involvement was critical for the success of the program since adults and parents in the home conduct most of the research on the misuse of bed nets. By having them participate in the program, we believe they will be reminded on the proper use of bed nets that will protect their children and themselves from malaria.

## Future Directions

Ongoing validation of this intervention is focused on two areas: (1) evidence of the effects of the intervention on participants' understanding of the importance of bed nets in preventing malaria, and (2) evidence of the effects of the intervention on the actual use of bed nets. However, both of these areas have experienced several obstacles.

It has been difficult to administer a test that can be completed without well intentioned but intrusive assistance in order to accurately assess students' knowledge. The administration of pre- and

post-tests to children who have limited educational resources and literacy has introduced a Hawthorne Effect bias, where subjects reported an improved aspect of their behavior in response to the fact that they know that they are being studied, or through primary educators or secondary translators who also have a bias of how their country is being portrayed in the medical literature. Although English might be the official language of education in Ghana, it is not always the lingua franca in isolated communities. We are working with colleagues in the School of Education to design an approach

Health providers, educators and community leaders were often present at the play, which served as a catalyst for discussion about malaria prevention at home and in schools.

that will assess pre- and post-performance knowledge of malaria prevention with the least distortion of data due to the support needed to implement testing.

In regard to the second area of validation, we are developing a plan to assess actual behavioral changes in children through parental interviews. Determining their actual use involves more than counting the total number of nets available in village households. Not



*Courtesy of the Author*

every family has the financial means to obtain a net for every child in the house and children often share a sleeping space. We will need to rely on parents' reports of the number and actual use of bed nets by each of their children before and after the experience of seeing the Anansi presentations. An expanded avenue of research might include investigating the prevalence of malaria in the targeted communities, and monitoring changes in these health measures. At this point, the required laboratory testing would be cost prohibitive. In addition, other confounding factors, such as the distribution of free nets from government health ministries or international organizations, also interfere with these validations as it changes the number of safe sleeping spaces, but supersedes experimental methods since it is vital to child welfare.

Although repetition of the play might increase bed net use temporarily, as with most interventions, diminishing returns can be expected. The effect of the message may stagnate and decrease over time. There is a probable finite number of times we can successfully convey the message of our play before it loses its effectiveness, but we rejected the idea of increasing the visual effect of the presentations by implementing more intense music, lighting or complicated sets. This would decrease the simplicity of the production, add to cost and logistically limit our ability to bring the play to the most isolated at-risk areas.

Since the project was a pilot and most of the professional services, bed nets, time and on-the-ground cost were donated, a question remains of the actual cost for up-scaling. The implementation in the field for a performance team could be decreased significantly by the incorporation of local public health advocates. The cultural expertise of local healthcare professionals and educators would be dynamic additions to this project. In-country production cost would be significantly less, and they could create a sustainable method for malaria prevention.

The authors believe that the Anansi program and other models of "edutainment" can be effective in conveying health objectives and, furthermore, that they are transferable from child to child. Although this project is specific to malaria prevention in West Africa, the concept of implementing culturally identifiable folktales, disease burdens, and a form of edutainment can be tools to design programs that encourage healthy behavior in children, and that these behaviors are transferable.

## Conclusions

Using the ancient art of storytelling, the authors repurposed folktales into modern disease control programs for children by simplifying public health issues to an elementary level. Stories regarding Anansi and other folk characters are used as part of the current Ghanaian curriculum in some schools. Stories like "Anansi Tricks

Mrs. Mosquito" could be incorporated into classrooms to convey a simple, but vital health message. Expanding this model into other countries is also possible. The number of folktales with potential protagonists available in different cultures is the only limit, and each country might have a different health objective to be achieved. For example, the Center for Global Health is investigating opportunities to use this model in other international communities including El Salvador (Chagas' disease or American trypanosomiasis prevention) and Haiti (where there is a widespread water sanitation concern). But other public health objectives, like vaccination campaigns, nutrition or dental hygiene could also be considered. The authors suggest that the use of the model described in this paper might be a practical method for reaching populations most vulnerable to specific disease burdens.

The Center's stated mission to enhance communication across different specialties and academic communities by creating innovative partnerships to improve overall health of communities has been achieved. By using an interdisciplinary approach incorporating education, medicine and visual arts, we each addressed our specific areas of expertise, thereby enhancing the overall project. We were also able to educate and inspire students with a special interest in global health by providing exposure to and immersion in international experiences through the lens of public outreach and disease prevention. The future of global health requires creative cooperative partnerships in order to be successful. When follow-up evaluations on the Anansi program are completed, we believe the study will provide important information on the efficacy of using culturally appropriate tools as a low cost, low technology method to influence community health behavior in remote areas of the world.

## Acknowledgements

Thank you to Dr. Edward Gotfried, Dr. Jesse Rohde, Dr. Zehra Ahmed, Charles Asiedu Bofo, Benjamin Dei Boadu, Jennifer LaCava, Karen Chandler, Shanacy Marler, Kenneth Ditler, Dr. Michael Uttendorfer, Dr. Janice Sawyer, Dr. John Kappenberg, Susan Gude, Michelle LaCour, Gail Sachs, Joan Baron Drury, and Doreen Weatherby (Bestnets). A special thanks to the students and residents involved in the performance of the play, without whom this project would not have been possible.

References available at  
**JGH Online,**  
[www.gjournal.org](http://www.gjournal.org)

