Taiwo, R. (2010). *The Thumb Tribe: Creativity and Social Change through SMS in Nigeria*. Obafemi Awolowo University, Nigeria. University of Freiburg, Germany.

Tayebinik, M. and Puteh, M. (2012). Txt msg n English Language Literacy. The 8th International Language for Specific Purposes (LSP) Seminar - Aligning Theoretical Knowledge with Professional Practice: Elsevier Ltd.

Wright, P. et al. (2000). Text entry on handheld computers by older users: Ergonomics. pp. 702-716.

Climate Information and Dengue Risk Reduction: Strategizing at the Barangay Level in Baybay, Leyte

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Abstract

This study is a descriptive analysis of barangay officials' risk reduction strategies against dengue, an infectious disease transmitted by mosquitoes in their communities. The objectives behind the study are: (1) to determine respondents' access and exposure to information on dengue, (2) to ascertain respondents' understanding of dengue, (3) to find out the strategies respondents currently use to reduce risks of dengue, and (4) to determine respondents' risk reduction strategies for dengue based on seasonal climate forecasts. The study's respondents are officials of Barangay Kansungka and Barangay Gacat, Baybay, Leyte who participated in a focus group discussion to enable the researcher to extract data on the disease, knowledge of the disease, sources of information on the disease, and experiences on the disease. The study is anchored on the constructivist perspective of research, a view that argues that reality is a product of an individual's construction, a product of his/her interaction with the environment, other people, and years of experience. The findings of the study are the following: (1) the respondent's sources of information on the disease is through the media (especially the television and radio), and information drives and lectures by health workers in the city; (2) the officials are knowledgeable about the disease; (3) current strategies include cleanup operations, discarding standing water containers, and burning of garbage; and (4) their strategies based on climate information – normal, dry and wet climate forecast – are very much similar. This study concludes that the respondents do not recognize the relationship between rainfall patterns and risk of dengue. This suggests the need to heighten awareness of the relationship between rainfall patterns and the disease. Moreover, climate information should be disseminated or made available to local officials.

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INTRODUCTION

Major documents and scientific gatherings have emphasized the need to develop and implement effective programs to reduce the risks associated with dengue. The reason for this is that morbidity and mortality brought about by this disease is increasing. The Centers for Disease Control and Prevention (CDC, 2014) reported that dengue is now an epidemic in Asia, the Pacific, the Americas, Africa, and the Caribbean, causing 390 million dengue infections in 100 countries annually.

Also known as break-bone fever, dengue is a mosquito-borne tropical disease caused by the dengue virus. The disease is transmitted by several species of mosquito within the genus *Aedes*, principally *A.aegypti* (Normile, 2013).

According to biologists, human activities are a big factor contributing to the increase of the population of dengue-carrying mosquitoes. Kilpatrick and Randolph (2012) indicated that increasing human population, urbanization, and agriculture has put pressure on vector-borne pathogens, including the virus carried by dengue-carrying mosquitoes (*Aedesegypti*), to infect humans and to be transmitted by vectors and hosts that live around humans.

In the Philippines, Capeding (2011) reported dengue as a leading cause of childhood hospitalizations, causing 285 deaths of children between 1 and 9 years old in September 2011 alone.

The implementation of RA 7160 (Local Government Code) stresses the democratic form of government in the Philippines. As such, local leaders are called on to play important roles in community development. Among these roles is addressing issues, including those related to health. Considering the onslaught of dengue, reduction of risk of the disease by way of prevention and control pose a big challenge to the local government units—especially at the barangay level.

This study explored barangay officials' responses to Seasonal Climate Forecast (SCF). Based on the forecast, they were asked to plan activities to prevent dengue in their respective communities. The aim was to capture their decision-making

process and examine their understanding of SCF and mosquito-borne diseases.

Baybay City, a component city in Leyte, is among the areas in the Philippines with high dengue incidence. The city is about 107 km away from the weather station. This situation makes Baybay a good case for a study on local leaders' risk reduction strategies for dengue based on climate information.

In general, this study aimed to find risk reduction strategies against dengue fever/dengue hemorrhagic fever (DF/DHF) based on given climate information (Seasonal Climate Forecast). More specifically, it aimed to:

1. Determine respondents' access and exposure to information on dengue;
2. Ascertain respondents' understanding of dengue;
3. Find out the strategies respondents currently use to reduce risks of dengue; and
4. Determine respondents' risk reduction strategies for dengue based on seasonal climate forecasts.

This study is limited to the risk reduction strategies for dengue by local leaders of Barangay Gacat and Barangay Kansungka in Baybay, Leyte chosen in consultation with the City Health Office of Baybay. Key variables investigated are respondents' understanding of dengue and its relationship with climate, current strategies to reduce health risks associated with dengue, and strategies to prevent dengue based on seasonal climate forecasts (SCF). In presenting the data, responses from the local officials of the two barangays were aggregated.

This study is in line with the United Nations Millennium Development Goal (MDG) No. 6--Combat HIV/AIDS, malaria and other diseases. Results of this study are important for a number of reasons:

a.) Results of this study will provide practical implications to the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) in improving its strategies in disseminating climate information; b.) Data on respondents' understanding of dengue could guide the Department of Health in

crafting strategies to strengthen its programs to reduce risks associated with dengue; and c.) This study could contribute in building research-based knowledge on this aspect. Moreover, this study could spark other researchers' and students' interest to conduct research on local leaders' strategies to reduce and manage health-related risks.

Analytical Framework

This study is aligned with the constructivist perspective of research which posits that peoples' understanding of this world is socially constructed (Mertens, 2005) through their interaction with the environment, including other people and years of experience. A social inquiry applying the constructivist thinking focuses on meanings or "constructions" rather than on facts. The goal is to understand the phenomenon by analysing the meaning that individuals associate with the phenomena. Thus, in social science research, the information generated is a product of a joint knowledge exploration and interpretation by both the researcher and the people being researched on (Campilan, 1995).

Informed by the constructivist perspective, this study aimed to explore local leaders' risk reduction strategies for dengue based on probabilistic information. While subscribing to the idea that respondents have different interpretations and, therefore, strategies in reducing risks of dengue, this study assumed that the strategies that respondents will formulate are a function of various factors (Fig. 1).

Figure 1. A Diagram Showing the Conceptual Assumptions of the Study
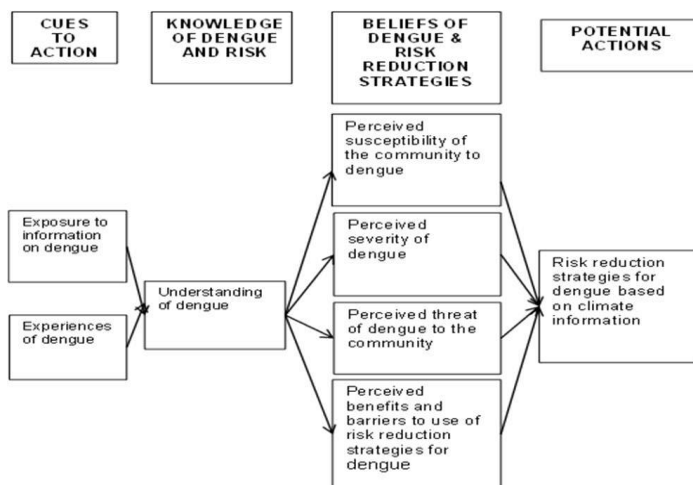
The first set of factors relates to their beliefs about dengue and the risk reduction strategies. These factors include their perceptions of susceptibility of the community to dengue, perceptions of severity of dengue, perceptions of the threat of dengue to the community, and perceptions of the benefit and barriers to use of risk reduction strategies for dengue. This study also assumed that respondents' beliefs about dengue and the risk reduction strategies are influenced by their knowledge of dengue and in turn, their knowledge is influenced by their exposure to information and experiences on dengue, called in this study as cues to action.

METHODOLOGY

This study dealt with local leaders' risk reduction strategies for dengue based on climate information. The depth of data required by the research problem necessitated the use of qualitative research methodology. The research required intensive conversation and observation with the research participants. Thus, a case study design was applied.

According to Yin (2009), a case study is an explanatory, exploratory, or descriptive analysis of a person, group, or event. Thomas (2011) added that a case study focuses on the analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically using mixed methods. Methodological triangulation (Mathison, 1988), was used to increase the reliability and validity of the interpretations of the findings. These multiple methods included analysis of the respondents' common decisions to the given forecasts, focus group discussions (FGD), ocular observations in the communities, and decision-making exercise.

Respondents for this study were current barangay officials in two selected barangays in Baybay City, Leyte. The choice of this group of respondents was hinged on the fact that barangay officials play important roles in the initiating development activities including prevention and control of diseases. Barangays Kansungka and Gacat were chosen in coordination with the Rural Health Unit for this study for the following reasons: 1) these communities had dengue infection every year, 2) the

officials were willing to participate in a decision-making workshop and have their responses recorded and analyzed, and 3) the communities were peaceful.

Baybay is an agricultural city located in Leyte. The common sources of livelihood are farming and fishing. It is mountainous from the East and it slopes down West towards the shoreline. The city has a generally wet climate and storms and typhoons regularly occur in the city. Typhoons "Yolanda" (Haiyan), and "Ruby" (Hagupit) are two of the recent super-typhoons that have visited the city causing significant destruction, the former in 2013, and the latter in 2014. Figure 2 shows Baybay in the province of Leyte.

Figure 2. A map showing the location of Baybay City
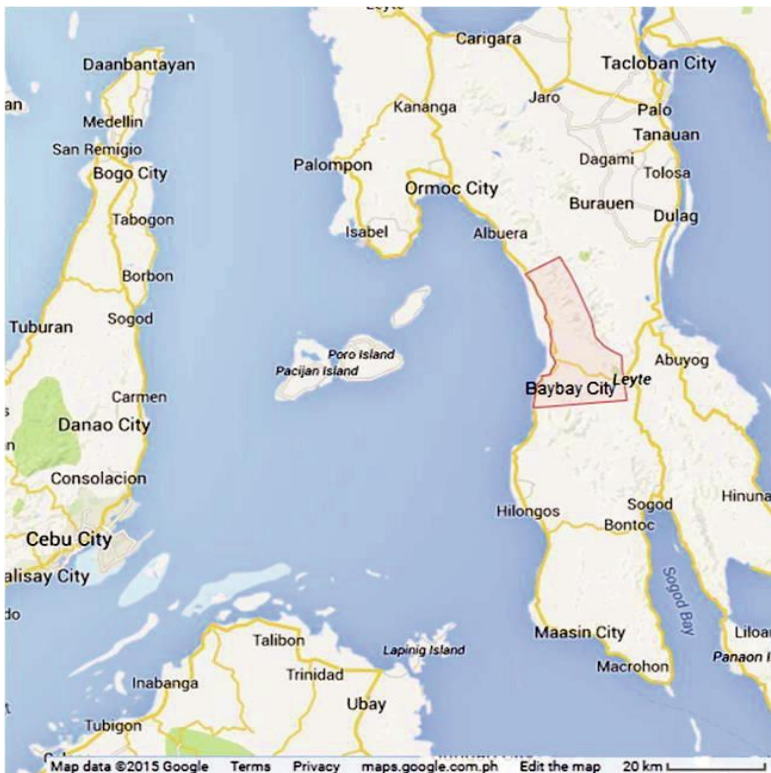
As of 2010, Baybay has a population of 102, 841. Barangay Gacat has a population of 1, 865. Barangay Kansungka has 837.

The instruments used in this research were focus group discussion (FGD) guide, key informant interview (KII) guide, and decision -making template.To capture the different realities in the two communities, the FGD for each barangay was done separately. Following the FGD, a decision-making workshop was conducted to elicit local leaders' risk reduction strategies for dengue based on the climate forecasts. The sequence of events in this workshop is in Table 1.

Referred to by other authors as "role playing", decision-making exercise has been extensively used to gather data on decision-making (i.e., Ziervogel, 2004; Borines, Gravoso & Predo, 2009). According to Ziervogel (2004), this method is advantageous because it enables researchers to go beyond taking a snap-shot of how people would react to a certain situation by surfacing a more nuanced understanding of a problem, situation, event or a phenomenon.

In the decision-making exercise, given that all climate forecasts are probabilistic in nature and that the forecasts may or may not occur, participants were asked to consider an assumption within the last three (3) years. More specifically, respondents were asked to assume that according to their experience in the previous year, there was a Low rainfall (Southern Oscillation Index, SOI -5), High rainfall (SOI +5) and, Average rainfall (SOI between -5 and +5). Then, they were presented with the video that forecasts probabilistic information and then asked what they plan to do to prevent or control occurrence of dengue in their community.

Table 1. Flow of activities in the decision-making workshop

Activity	Brief Description
Orientation	Overview of the workshop activities, introduction of the resource person and facilitators and documenters, discussion of objectives and expectations
Decision-Making Exercise	The decision-making exercise formed the heart of the workshop. For this portion, activities followed this sequence below. Questions were entertained by the facilitator. • Respondents were asked to assume that they had experienced either Low, High or Average rainfall for the past year. • Playing of the video on the climate forecasts produced for this study • Decision-making by the local leaders (participants) • Presentation of decisions by participants • Discussions to clarify things and gather additional data This process was repeated three times because there were three seasonal forecasts (i.e., High, Low and Average rainfall).
Wrap Up	Participants were encouraged to ask more questions about SCF use, issues on climate variability and concerns related to reduction of risk dengue for their constituencies.
Closing Ceremonies	Acknowledgment for the local of the local leaders' participation, impression by participants and formal ending of the workshop.

Study Tools. Each climate forecast was presented in video. The choice of this medium was based on the following considerations: 1) A video is effective in presenting realistic information, 2) the respondents, being officials of a local government unit should be highly exposed to video and television (TV), and 3) participants are familiar with weather forecasts on TV. For this study, three video climate forecasts were produced. The video presentations were designed to be similar to the weather forecasts aired on commercial television. Video scripts were subjected to a review by communication specialists and technical experts to determine the appropriateness and understandability of the video presentations and technical accuracy of the videos, respectively.

As a qualitative research, data in this study are presented in narrative form after having been subjected to a thematic analysis. Table 2 presents the data analysis matrix for this study.

Table2. Data analysis matrix

Objective	Key variables	Data gathering tool	Data analytic tool
Determine respondents' access and exposure to information on dengue;	Access and exposure to information on dengue and risk reduction strategies	FGD Guide	Thematic analysis; narrative form
Ascertain respondents' knowledge of dengue;	Knowledge (mental models) of dengue and risk reduction strategies	FGD Guide	Thematic analysis; narrative form
Find out the strategies respondents currently use to reduce risks of dengue;	Risk reduction strategies for dengue currently used	FGD Guide	Thematic analysis; narrative form
Determine respondents' risk reduction strategies for dengue based on seasonal climate forecasts	Risk reduction strategies for dengue based on climate information	Decision- Making Template	Thematic analysis; narrative form

RESULTS AND DISCUSSION

Access and Exposure to Dengue Information

The respondents reported that they received information on dengue through the media, especially the television and the radio. Information on the disease was mainly obtained from news programs in leading TV channels in the country. They also reported that they were taught things about dengue by health workers and local government unit (LGU) personnel who visit their communities and hold lectures about the disease and its prevention. The City Health Office of Baybay conducts extension services to provide information on the disease and on how every citizen in the barangay can take part in prevention and mitigation measures, including maintaining cleanliness and removal of stagnant water, as reported by the respondents. However, respondents said that this information dissemination on dengue needs to be strengthened to make sure that the locals understand this information well. They said that the information drives are done in English, not Cebuano, the local language of the barangays, and that the lecturers just read text from the PowerPoint presentations and do not expand the points.

Respondents' Beliefs and Understanding of Dengue

The respondents believe that dengue is a very dangerous and life-threatening disease. They reported that dengue comes from a bite of a certain mosquito that has white patterns on its body. They reported that such mosquitoes like to lay eggs on dirty stagnant water such as in flower vases, beverage bottles, puddles, banana trees, wet garbage piles, and unclosed barrels. The respondents also enumerated symptoms including recurring fever, rashes, nosebleeds (epistaxis), diarrhea and vomiting. This is why the disease is very dangerous and life-threatening. The respondents are also open to the possibility that patients displaying symptoms of the disease might be a victim of the actions of a supernatural being/s. They reported that the patient might be an object of the supernatural creature's infatuation and this is its way of expressing it, or it may be expressing its anger because of some actions done by the human.

Respondents said that their communities are not susceptible to dengue and the threat of the disease to them is not that high yet. However, they continue to implement the prevention measures they have learned from various sources. These prevention measures include cleaning up their surroundings, removal of stagnant water, and burning of leaves to ward off the mosquitoes. According to them, some residents in their communities use mosquito nets. They reported that once the symptoms occur, one should immediately take the patient to a health care facility in order to be attended to. They have also mentioned that the herb locally known as *gatas-gatas* (*Euphorbiahirta*) is a reliable cure for the disease. According to them, they collect *gatas-gatas*, boil it, and then ask the patient to drink it. Respondents believed that *gatas-gatas* extract improve platelets count.

Figure 2. A map showing the location of Baybay City
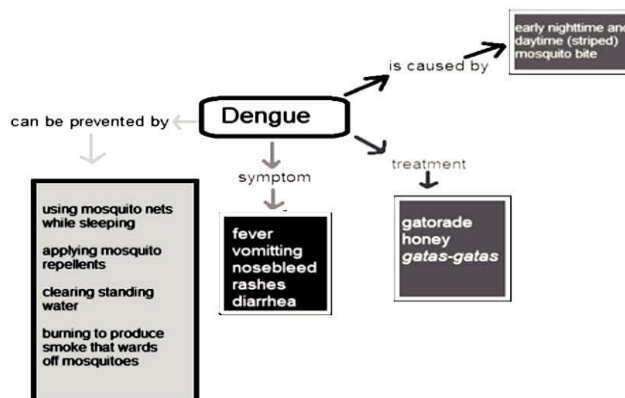
Risk Reduction Strategies for Dengue

The respondents reported that their communities are not susceptible to dengue and that the disease is not very severe yet in their communities. For example, participants from Barangay Kansungka reported that cases of dengue in their community are only very few and that in these cases, the disease is often acquired from outside of the barangays. They attribute this to the irregular garbage burning activities which they do to get rid of their solid waste. They also said that the activity wards off the mosquitoes. These strategies however, are not based on climate information. These are the actions they employ to prevent the disease as they have learned from various sources.

In order to prevent the disease, they suggest cleaning operations, information dissemination, and warnings. They reported that it is important to inform every household and warn them of the hazards of the disease. They also suggest lectures on the disease. This is to enlighten people on things that they might be missing when it comes to the disease – for example, they might not know that some parts of their household might be good spots for mosquitoes to lay eggs.

Risk Reduction Strategies against Dengue Based on Climate Information

Wet Climate Forecast. For this situation, the participants of the decision-making workshop were made to assume that in January 2015, t h e amount of rain fall in Baybay, Leyte will be above normal. The respondents said that they would carry out awareness campaigns, and encourage citizens to take precautions so that stagnant water might not pile up in their homes.

Dry Climate Forecast. For this situation, the participants of the decision-making workshop were made to assume that in the months of February, March, and May2015, t h e amount of rain fall in Baybay, Leyte will be below normal. The respondents said that they will initiate cleanup operations (discarding stagnant water, cleaning the surroundings), information dissemination on dengue, and preparations for coming rains in order to avoid favorable situations for dengue mosquitoes to propagate.

Normal Climate Forecast. For this situation, the participants of the decision-making workshop were made to assume that in the month of April 2015, the amount of rainfall to be anticipated will not be below or above normal. The respondents said that similar responses will be followed—they will carry out information drives, awareness campaigns, clean up operations and preparations to avoid future possible emergence of the disease.

Figure 4. *Strategies to reduce risk of dengue based on climate forecasts*
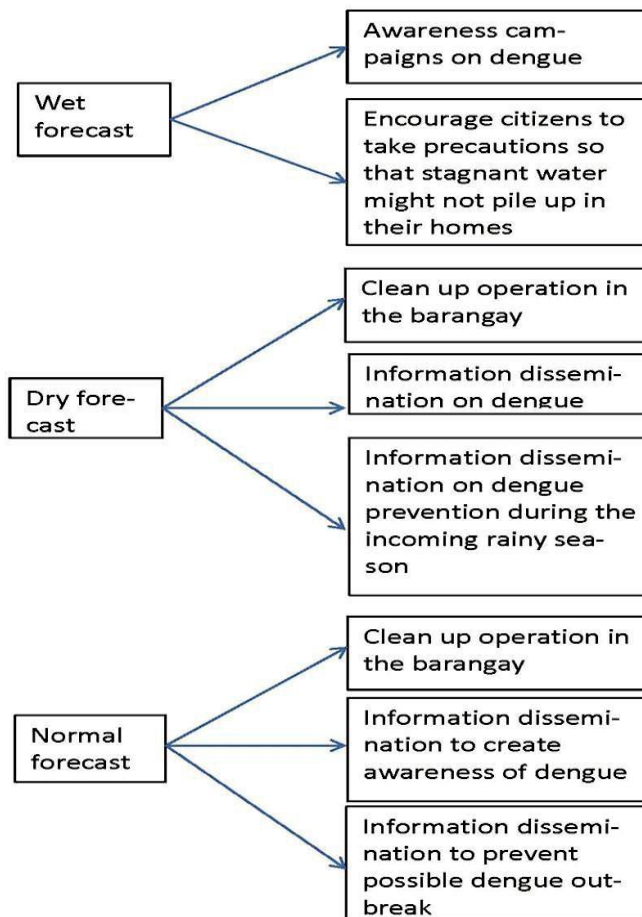
CONCLUSION AND RECOMMENDATIONS

The local officials who participated in this study are highly exposed to information on dengue but have low exposure to climate information. They also have high awareness of the disease and its preventive measures. Currently, respondents apply various strategies to reduce the risk of dengue in the irrespective communities. Regardless of forecast, respondents would implement awareness campaign on dengue and clean up activity in the barangay. There is a similarity of their actions across forecasts (wet, dry, and normal). It can be deduced that respondents have not recognized the relationship between rainfall patterns and dengue outbreak.

Although the respondents' risk reduction strategies for dengue, both current and those based on climate information, may be responsive, there is a need for the Department of Health and other concerned agencies to improve the capability of these local leaders in preventing dengue. The fact is, despite their use of such strategies as awareness raising, burning of garbage, emptying water containers, and clean up, these respondents reported dengue cases in their respective communities. Highlighting their lack of skills to deal with the disease, one respondent confided that the dengue infection of a family member led to a host of health problems.

These results may not only be unique to these local officials. It is, therefore, high time that local leaders be taught on more strategies to deal with dengue. From the literature, the integrated water management (IWM) (Espino, et al., 2012) presents itself to be promising. In the case of these respondents, although they may be implementing some elements of IWM, what remains lacking is the formulation of a concrete policy by way of passing a barangay ordinance for the whole community to combat the risk of dengue. The policy may spell out the specific penalty for residents and guests who will demonstrate behaviours that will promote multiplication of dengue mosquitoes.

Gleaning from the respondents' courses of action based on climate information, it appears that these local officials fail to recognize the relationship between rainfall pattern and dengue outbreak. Given the proven efficacy of climate information as an early warning system for dengue, it is suggested that local leaders be taught on how to capitalize on information as a tool for managing the risks of dengue.

For researchers, respondents reported methods for treating dengue including drinking *gatorade* and drinking of *gatas-gatas (Euphorbia hirta)* extracts. It is recommended that studies be conducted to probe into the efficacy and safety of treating dengue patients with *E. hirta* extracts. Research shows that *E. hirta* absorbs heavy metals including lead (Mendoza & Hipe, 2008), a carcinogenic metal.

Moreover, the present study has focused on two barangays only. More studies are needed to verify the findings of the results. Future studies may involve more local leaders and cover more areas.

REFERENCES

_____ (2014). Centers for Disease Control and Prevention: Epidemiology of Dengue. Retrieved May 22, 2014, from Centers for Disease Control and Prevention: http://www.cdc.gov/dengue/epidemiology/.

Campilan, D. M. (1995) . *Learning to change, changing to learn: Managing natural resources for sustainable agriculture in the Philippine uplands.* Wageningen, The Netherlands: Waginengen Agricultural University.

Capeding, M.R. (2011). Dengue in the Philippines. Retrieved on 10 August 2011 from http://www.denguematters.info/content/issue-7-dengue- philippines.

Espino, F., Marco, J., Salazar, N., Salazar, F., Mendoza, Y., & Velasco, A. (2012). Community-based dengue vector control: Experiences in behavior in Metropolitan Manila, Philippines. *Pathogens and Global Health*, 106(8), 455-460.

Kilpatrick, M., & Randolph, S. E. (2012). Drivers, dynamics, and control of emerging vector-borne zoonotic diseases. *The Lancet, 380* (9857) 1946-1955.

Mendoza, C.S., & Hipe, J. (2008). Lead content of leaves in Cebu City, Philippines. *South Pacific Studies*, 28(2), 43-52.

Mertens, D. (2005). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches.* Thousand Oaks, CA: Sage

Normile, D. (2013). Surprising new dengue virus throws a spanner in disease control efforts. *Science, 342* (6157), 415.

Thomas, G. (2011) . A typology for the case study in social science following a review of definition, discourse and structure. *Qualitative Inquiry, 17* (6).

Yin, R. K. (2009). *Case Study Research: Design and Methods* (Fourth ed.). Thousand Oaks, California: SAGE Publications.

Ziervogel, G. (2004). Targeting seasonal climate forecasts for integration into household level decisions: The case of smallholder farmers in Lesotho. *The Geographical Journal, 170(1)*, 6-21.