

A QUALITATIVE ANALYSIS: USING THE HEALTH BELIEF MODEL TO EXPLAIN DENGUE FEVER IN TWO COMMUNITIES IN TRINIDAD AND TOBAGO

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The prevention of dengue fever in Trinidad and Tobago is highly dependent on the sustained effectiveness of the *Aedes aegypti* mosquito prevention programme. The Health Belief Model (HBM) framework was used to explore the public's perceptions of the dengue fever prevention programme in Trinidad and Tobago. It further focused on persuading people to acknowledge their susceptibility to dengue fever and the benefits of undertaking mosquito control while storing water for domestic use.

Focus group discussions, in-depth interviews informal interviews, and non-participant observation were conducted with female and male members of Malick and Upper Malick communities. Content analysis was used to identify meaning units that were condensed, coded and assigned to pre-determined elements of the Health Belief Model (HBM).

Awareness of dengue fever and *Aedes aegypti* was high but the illness was not high on the priority listing. Respondents perceived the problem of increases in mosquito population as a Government problem and not a household problem. Their perception of the *Aedes aegypti* control programme was low in significance in both communities. In general, members of both communities had the knowledge of dengue fever and the *Aedes aegypti* mosquito but the knowledge was not linked to any significant behavior change.

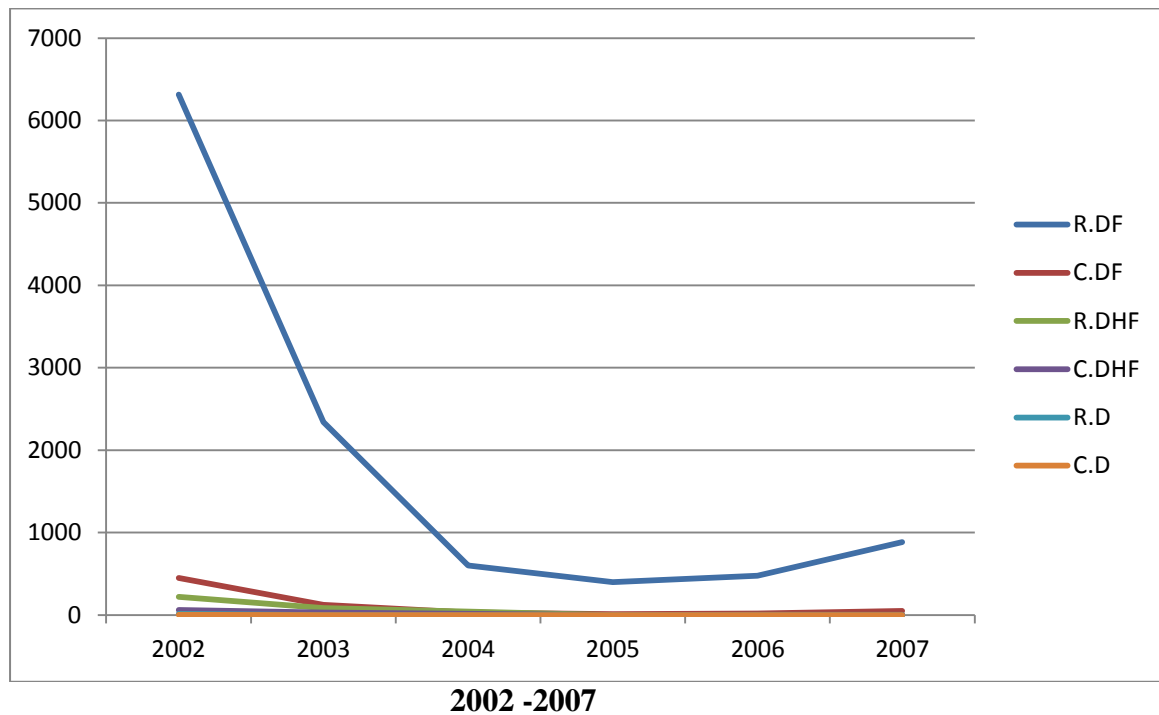
The identification of barriers prevailed over the benefits of mosquito control practices. The development of health education intervention should consider the socio-cultural environment in which control practices are encouraged.

Keywords: Dengue fever, Health Belief Model, Qualitative analysis, Trinidad and Tobago.

Introduction

According to data reported by the Pan American Health Organization (PAHO), dengue fever first appeared in Trinidad and Tobago in the early 1980s (PAHO 1994). In 1991 there was a significant epidemic when approximately 3,000 cases were reported, and since 1997 dengue fever outbreaks have become a yearly event, with some years more severe than others. In 1996, dengue haemorrhagic fever first appeared creating critical health problem overtime. (See Figure 1 overleaf).

Figure 1



Distribution of Reported and Confirmed Dengue Fever, Dengue Haemorrhagic and Death.

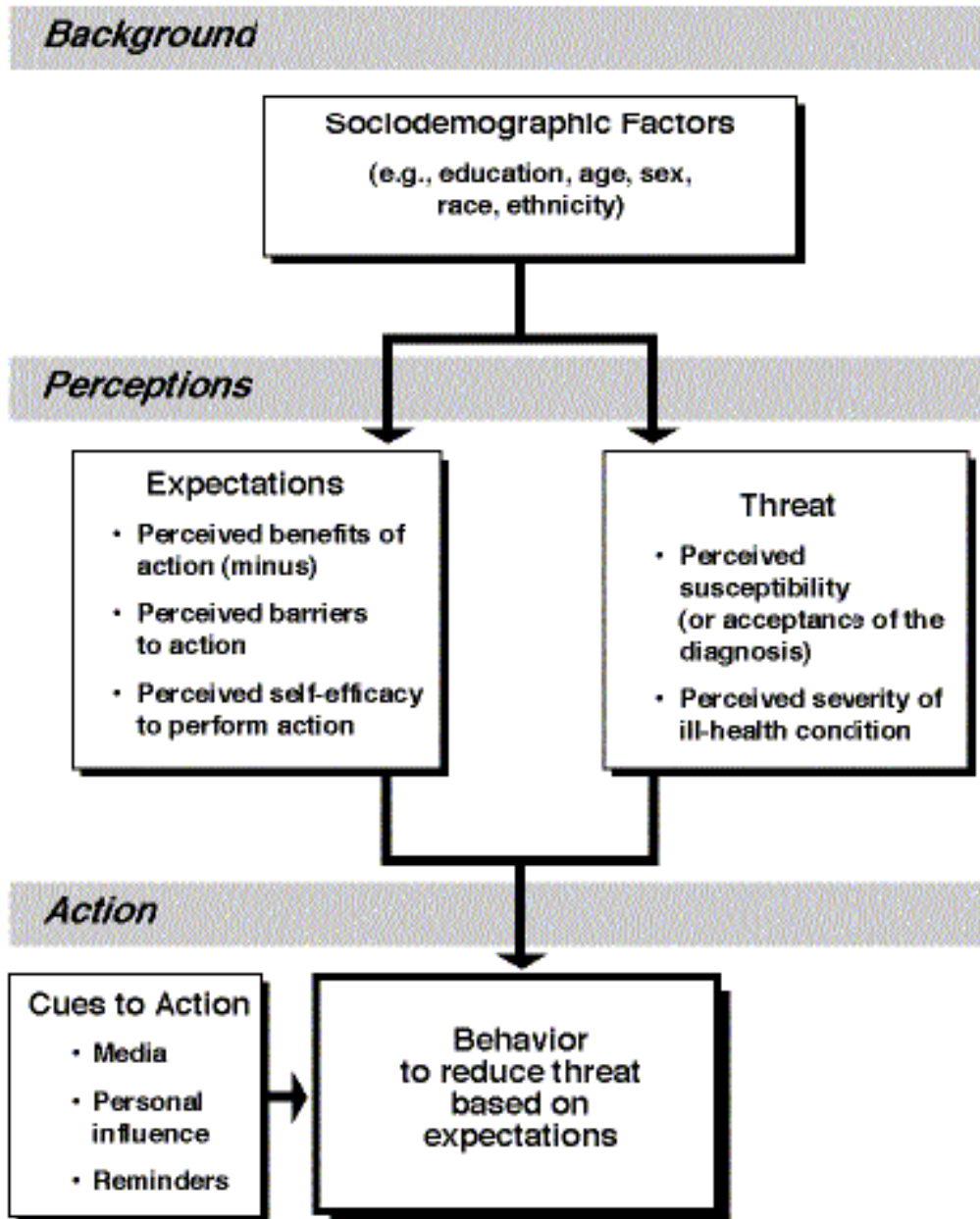
As a lifestyle disease, dengue fever is associated with considerable negative individual social outcomes, yet this negative behavior is performed by many people. Regulating this behaviour through persuasive information is generally unsuccessful, and in recent times, the Ministry of Health has recognized that the social acceptability of this behavior is a major obstacle facing such intervention. Some of these behaviours are; keeping water containers uncovered, keeping used tyres where water can be collected and the overgrowth of bush on vacant household premises.

Studies done in Trinidad have revealed that members of society can associate the *Aedes aegypti* mosquito with dengue fever (Rosenbaum et al., 1995; Ramlackhansingh et al., 1998). The increase in knowledge has increased awareness yet the preventive behaviour is not sustained. Members of society continue to leave containers uncovered causing an increase in mosquito larval production. The success of the *Aedes aegypti* programme relies heavily on members of the society taking full responsibility of their community's control actions. Many studies have shown that household mosquito control activities can result in an unsatisfactory outcome (Gubler and Clark, 1996; Winch et al., 2002). Community participation in dengue fever control can be difficult to maintain, especially, after outbreaks.

In an attempt to better understand health-related behavior and the determinants of adherence to health interventions, a number of theoretical models have been proposed. The Health Belief Model (HBM) is one of the most widely used social cognition models to study and promote the uptake of health services and predict health behavior. Although it was originally developed in the 1950s to explain the low participation in medical screening programmes, today it is used for a broad spectrum of health-related behaviours. It has been used in

HIV/AIDS research, mainly for understanding risk behaviours (Glanz, Lewis and Rimer 1997). (See Figure 2).

Figure. 2



Source: Rosenstock I., Strecher, V., and Becker, M. (1994). The Health Belief Model.

The Health Belief Model (HBM) states that, in the case of prevention, individuals will take a health related action if they have a desire to avoid an illness and if they believe that a specific health action will prevent the illness. The model includes six elements:

- 1) Perceived susceptibility of the individual to the condition
- 2) Perceived severity of the condition as having a serious medical and social consequences
- 3) Perceived benefits of taking the health action in reducing the disease threat as well as other additional benefits.

- 4) Perceived barriers to taking the health action, which should not outweigh the benefits. These four perceptions are elements that determine the readiness to take the action. They are activated by:
 - Cues to action which trigger this readiness
 - Self-efficacy, which is the conviction that one can successfully execute the health behavior (Glanz, Lewis and Rimer 1997).

Given that the aim of controlling dengue fever is highly dependent on sustained effective coverage of the Health education and *Aedes aegypti* control programmes, it is important to understand the communities risk perceptions about the disease and how the perceived need for continued dengue fever prevention behavior is influenced by the significant reduction of *Aedes aegypti* mosquitoes. In this study the Health Belief Model (HBM) framework was used to explore the perceptions and beliefs of members of communities of Malick and Upper Malick.

Methodology

To explore the perceptions and beliefs of the *Aedes aegypti* mosquito and dengue fever control programmes of the communities of Malick and Upper Malick, the Health Belief Model (HBM) was deemed to be most appropriate. The Health Belief Model (HBM) was used to guide the data collection and analysis in order to explore the different perceptions about *Aedes aegypti* mosquito and dengue fever control. The methods used for collecting data consisted of a mixture of focus group discussions, in-depth interviews with key informants who were both formal and informal leaders in both communities,

Study site

In the study, data was collected at two districts in the urban municipality of Barataria. Barataria is a town on the eastern boundary of Morvant and Laventille. The two areas are Malick proper which is considered urban and Upper Malick which has most of the characteristics of rustic rural life. Classification of rural is imperfect, and certainly one has no sense of what rural is. Classification does not explicate the social, economic, demographics, infrastructures, or political context of rural. The locale needs to be considered along with cultural, social, and economic aspects of the environment, since the context in which people live is of great significance.

The conceptualization of what the researcher considered to be rural might draw the discussion into an argument, since what the society interprets to be rural (areas where there are no urban centers) is based on their construction of reality. Hugo (2002) defined rural in broad terms, to incorporate, everything that excludes capital cities, and major metropolitan centers of Australia that is approximately 30% of the Australian's population. However, rural is not only geographical, there are relative terms such as patterns of connectedness, that link an individual living in that environment to other individuals, and to a group, and community setting (Baum, 2001). Rural in Trinidad and Tobago is characterized by a decline in the quality of life in most communities, declining ability for households to educate children and afford health care, large number of rural communities are without potable water services, the existence of very poor roads, which result in expense transport cost, increasing environmental degradation especially soil erosion and loss of biodiversity, high levels of unemployment and underemployment, poor attitude of the young and an increase in pregnancy among the young females. These are aspects of rural that are relevant to this research.

Data Analysis

The transcribed interviews were subjected to content analysis with qualitative software Atlas-ti (Muhr & Friese 2004). The Health Belief Model served as the main frame work for this study and its elements served as the categories. Key categories were predetermined according to the theory used (i.e. perceived susceptibility, perceived severity, perceived benefits, perceived barriers of dengue fever prevention, cues to action, and self-efficacy. Each interview transcript was read and meaning units were extracted independently by the researcher. Meaning units were copied into a matrix where they were condensed and assigned a code. The researcher then compared the codes under each category, and came to a final analysis outcome. No ethical issue was raised due to the fact that the researcher was well known to the members of the communities. At the end of the research, a copy of the completed study was delivered to the researcher's key informant.

Results/Findings

The perception of dengue fever as a disease

All participants knew dengue fever as a disease caused by the *Aedes aegypti* mosquito. The young participants had learnt about dengue fever from their schools as part of a series of health education programmes sponsored by Kiwanis (an International social club which focuses on community services). Others learned about *Aedes aegypti* mosquito from the media such as television, radio, and newspaper reporting the fatalities of the disease. All participants (40) believed that young children were the highest-risk groups for the disease. Most participants (32) recognized high fever and muscle pain as common signs of dengue. Nonetheless, the epidemic response in the communities most likely is fatality, which creates a conscious awareness of survival by making members consider the presence of dengue fever.

However, perceived susceptibility was strongly linked to mosquito density and was considered higher when mosquitoes were more prevalent. Yet susceptibility varied among participant.

“What is a little fever? We will go to the health centre or a private doctor. I am never worried with dengue fever.” “I have known the black and white mosquito spreads dengue fever.” “This was about ten years ago, mosquito's bite us every day but we've never get sick with dengue fever.” (Informant 1).”

“This place always have mosquito. Twenty years I am living here and mosquito never stop biting us. We have to use cocksette (mosquito coil) and blacksage bush (wild shrub) as a repellent to prevent mosquito bite (Informant 3).”

The poor maintenance of roadside drains in Malick and the poor physical infrastructure of Upper Malick were associated with sanitation and drainage problems. Participants perceived the eradication programme of the *Aedes aegypti* mosquito as the sole responsibility of the Government.

“The Government not cleaning the drains. All the drains blocked up with rubbish. That is why we have so much mosquito. Don't talk about Upper Malick, them people want everything road, water, drains, and sewer.” (Informant 6)”

In the communities of Malick and Upper Malick the *Aedes aegypti* mosquito is well known by its black and white colour, biting and breeding habits. This mosquito has an affinity for breeding in clean clear water irrespective of location or volume. Table. 1 is a description of the participants ranking of mosquito breeding sites in the communities. The reproductive stages of the *Aedes aegypti* mosquito take place entirely in clean clear water. Participants perceive the larva as a living entity which determines the sterility of the water and which should always be present as an indicator of the water being good to drink. The cultural belief surrounding the larval discourse runs contradictory to the preventive measures of the Ministry of Health.

Table 1: Ranking for Mosquito Breeding Sites

Ranking Number	Upper Malick (rural) N=20	Mean Ranking	Malick (urban) N=20	Mean Ranking
1	Discarded, tins and cans	16.46	Discarded tyres and other containers	16.42
2	Garden containers	2.08	Roof guttering	2.44
3	Water containers for flushing toilets	4.68	Plastic buckets	5.30
4	Water containers in bathroom	7.92	Water containers in bathroom	7.92
5	Plastic buckets without lid	10.56	Flower vases	10.44
6	Plastic pales	11.00	Plastic pales	10.92
7	Flower pots and saucers	13.16	Brick Holes	13.08
8	400 gallons plastic tank with lid	14.88	400 gallons plastic tank with lid	7.04
9	Overgrowth of bush	15.28	Overgrowth of bush	15.12
10	Roadside drain	15.76	Roadside drain	15.42

“We only know that our water is good for drinking when we see the “little worms” swimming around in the water. When the Health worker places the chemical in the water and the “little worms” die, we then tell ourselves if this chemical can kill the “little worms” then the water is not “alive,” “the water is dead and it can kill us too.” (Informant 8).

The versatility of the *Aedes aegypti* mosquito coincides with its survival quest. It is not surprising that in times of scarcity of clean water she can be found competing with indigenous “dirty water” breeding species of mosquitoes for breeding space. The *Aedes aegypti* mosquito because of its domesticated characteristics, and daytime biting habits, can

be found hiding in all dark places inside the home. They feed on the blood of householders and breed in any available uncovered water container. All water containers inside the homes that remain uncovered become potential breeding sites for these mosquitoes.

Perceptions of Control Effectiveness

Most participants from both locations regarded adulticide (killing of the adult mosquito) space-spraying or ultra low-volume (ULV), and thermal-fogging as the most effective control measure. When the number of mosquitoes is reduced, people feel more comfortable. For example, they can spend more time outside at dusk, or do household chores without turning on the fan, or being annoyed by mosquitoes presence. Some participants thought ultra-low-volume (ULV) involved a harmful chemical that can contaminate their food. They therefore, they kept their windows and doors closed. They only accepted spraying outside the house.

“The Health department only come around and sprays when there is dengue in the area. The spraying, most of the time only drives away the mosquitoes. After two to three days, we have more mosquitoes” (Informant7)”

Larvicide or Temephos

Control messages recommend the adding of temephos (insecticide used for killing mosquito larvae) by Ministry of Health workers to containers that cannot be covered. The common perception that temephos is a harmful chemical, discourages its use particularly in drinking water, although health education materials indicate that temephos added in the correct dosage is safe for drinking. Due to the perception that temephos is a harmful chemical, creates further barriers for control activities within the *Aedes aegypti* control programme.

By comparing control methods, some participants accepted that temephos was effective in larval control, but was not as tangible as ultra-low-volume (ULV) spray and thermal fogging. Participants in both locations believed that source-reduction, which is the removal of all used containers from one's premises was more effective as a method for preventing mosquito breeding.

Covering containers

Health education materials suggest containers that can be covered should be covered with cloth-netting and topped with lids. Lids are commonly used to cover drinking water containers. However, containers that were regularly used remained uncovered. Using lids on frequently used containers was considered impractical by the participants. Some participants thought that lids were unnecessary for containers that contained non-potable water. Participants pointed out that because they forget to cover containers, mosquitoes were able to gain access to the water in the containers. However, they failed to mention, without prompting, the condition of the lids. The perception that faulty or broken lids are unusable discourages residents from obtaining new ones, thus reducing the effectiveness of covering materials in preventing mosquito infestation. Lids were not a priority for some householders.

Weekly cleaning of containers

Cleaning containers weekly is an effective larval control measure but is not practical with large containers such as large tanks and barrels. Weekly cleaning of less frequently used

water containers was perceived to be unnecessary and wasteful, as people either covered those containers with lids (mainly drinking water), or did nothing, as the cleanliness of water was not a concern (non-potable water). Another barrier to weekly cleaning was that water as an unreliable commodity cannot be used for cleaning purposes.

Perception of Aedes aegypti campaigns

Almost all participants revealed that the present *Aedes aegypti* control campaigns were only effective over a short period of time. Outside campaign times, control activities were irregularly performed and this decreased the effectiveness. Moreover, residents did not fully participated in the *Aedes aegypti* control activities, Most participants understood *Aedes aegypti* control activities, but inconsistently, found it difficult to keep with the suggested regimes of mosquito control. They did not think that they were at risk for dengue fever, or had mosquito larvae at home and they thought the control was best left in the hands of the Ministry of Health, who could undertake more effective widespread spraying activities. Many held an overriding belief that control of *Aedes aegypti* mosquitoes was an unrealistic goal.

Most participants, in both locations that since mosquitoes can fly from one place to another, householders were fighting a losing battle and controlling mosquito at the household level would make little difference to the overall population of mosquitoes, which they perceived as coming from the neighbourhood, especially public places such as drains and overgrowth of bush. Participants, pointed out that successful mosquito larval control was possible only if, carried out by all householders and control agents were accessible and available. Participants' perception of the effectiveness of control is based on the reduction of adult mosquitoes, not larvae. Getting rid of *Aedes aegypti* from water containers may not reduce the number of adult mosquitoes greatly, since other mosquitoes were found in and around houses. Participants perceived that the *Aedes aegypti* control programme is not effective or responding to their problems.

Discussion/Conclusion

The study indicates that members of both communities were aware of the preventive measures associated with dengue fever. Yet it is only when someone is affected by dengue fever that a conscious effort is made to eradicate the *Aedes aegypti* mosquito. Whether, this is caused by fear or misperception is a matter to be explored. According to Curry et al. (1990); Kahneman et al. (1982), preventive behavior is a function of the perception of threat and of the belief that the best course of action includes new behaviour.

The communication of the Preventive Health Education's media messages is very important within the context of behavior change. This is so, since cultural beliefs and values are internalized constructs. Media messages must be convincing enough to avoid the members of the communities from throwing away their water which had been treated with larvicide. According to Becker & Janz (1987), "one's general orientation to health as being dependent on one's subjective cultural beliefs and values."

From a public health perspective this behavior is clearly irrational. Gillet (1985), suggests that this is an example of a cultural barrier while Gubler (1989), argued that this is a failure of individuals to take responsibility of their own health. Often there is an assumption in health promotion campaigns that people need to be 'scared' into action. Ironically, this is the least influential component of the Health Belief Model.

Despite many limitations of the application and usefulness of the Health Belief Model, many health development programmes, especially tropical disease programmes have used this model with some success (Kendall, 1998). The literature suggests that the success of preventive health programmes using the Health Belief Model is more likely if attention is paid to the socio-cultural context. Through the collection of interview information (focus groups, in-depth interviews, and non-participant observation) an interesting gender issue appeared. Women took a more active role in all aspects of neighborhood life. Although this information does not contribute to the literature in terms of the gendering of dengue prevention, it instead, creates a new avenue for exploration into gendered disease knowledge. Caribbean family organization is characterized by a domestic system in which women play a dominant role (Otterbein 2009). One can therefore understand the cultural nature of the gender issue where it becomes natural for women to take the lead. It is important that cultural anthropology be recognized as relevant to research such as this one. One limitation in drawing any gendered conclusion from the findings of this study is the limited number of male interview participants. This was most likely a function of the impatient and disinteresting nature of the male participants. Therefore, in future studies, strategies to incorporate men must be developed.

Since women are the main caretakers of the household, health education efforts should be targeted at them. Meeting members of the communities forms part of the education programme of the Ministry of Health. The main objective is to communicate to the residents' basic information of *Aedes aegypti* mosquito and the prevention methods of dengue fever. Dengue fever can be considered an emerging infectious disease, as cited by Gubler and Clark (1994) with its severe and potentially fatal variant Dengue Haemorrhagic Fever (DHF).

The Health Belief Model did not take into account the role of culture, specifically acculturation, in how individuals ultimately make health decisions and undergo behavior change. This research's main goal was to identify any association between the mass media used as information and health behavior. It is very difficult for most people to throw away used cans, bottles, and used tyres that are found on their premises since to them these articles do have some significant use. Mazine et al. (1996) view culture as a set of relatively static 'beliefs and behaviours' that are conducive or detrimental to the maintenance of good health.

The researcher believed that people in Trinidad and Tobago, have some knowledge of dengue fever and how it is transmitted, but government's attitude with respect to community affairs has created a strong disincentive to engage in communal actions. This argument can be supported by a study done by Whiteford (1997) whose argument linked ethnography of household water use and its impact on dengue fever's transmission to local views of national political history in the Dominican Republic. In Trinidad and Tobago, dengue fever prevention continues to be a low priority by individuals and government. Winch et al. (1992) identified that improvement in basic services, such as refuse collection, and water supply were key prerequisites for dengue fever prevention in Trinidad and Tobago. These prerequisites are perceived as top priorities by residents.

Finally, in no way this research should be used as a final evidence of dengue fever health prevention behaviour. Instead, it should be used as a baseline for future health education intervention programmes, including health education efforts for residents, especially those residing in the urban areas. The researcher feels that by understanding the underlying socio-cultural changes that account for changes in behavior, the process would facilitate the transfer

of behavior change techniques across domains of behavior that would produce a catalogue of effective techniques which would provide a foundation for a socio-culturally based technology of behavior change.

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