Management Strategies in the Control of Dengue Fever in Ilocos Sur

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Abstract

The study aimed to determine the management strategies observed or practiced by the respondemis in the control of dengwe fever in Ilocs Sr. It farther determined the occurrence of dengue fever in Ilocos Sr daring CY 2000-2002. The respondents' background knowledge on dengue fever, their management strategles in the control of the said communicable disease in ierms of mosquito elimination cad prevention from mosquito bites were measured. The relationship between the occurrence of the disease and the respondents' managenent strategies in terms of background knowledge about dengue, mosquito elimination and prevention of masqsiio bikes was also found out.

The study made use of the descriptive research design. A 5-point scule questionnaire checklist was *used in gathering data on awarenes, observations and practices of respondents in the control of denguefever. The data were sadistically treated with frequency count, mean and Point Biserial Correlation.*

The following findings and conclusions were drawn from the data gathered. The occurrence of dengue fever in {locos Sur was *highest in 2000 and the number of cases declined in 2001 and 2002; the respondents had a high level of* **background knowledge on** *the nature of dengue vector, etiology and disease causation; the control of mosquito breeding and proliferation at average level; some practices* **were** *highly observed because they were part of household activities; and costly procedures like use of electric mosquito killers and "off lotion" were practiced/observed at low level. An inverse relationship was found* **between the** *respondents' level of background laowledge el the occurrence of dengue fever. However, management strategles in mosquito breeding eliination significantly affected the occurrence of dengue fever.*

Based on the conclusions, the following recommendations were forwarded: a regular radio program on health and nutrition in all radio

stations in the locality should be carried out as an extension service of the umiwersily; massie cleaning activities should be condhwcled especially in possible breeding places for mosquitoes in and around houses, school rooms and grounds; fogging practice with sawfacpowder to be more effective should be done simultaneously in neighboring barangays at close intervals;; imkensie campaign on the management strategies against mosquito bites llke the use of mosquito nets, pajamas or log dresses, electric fans and spraying of insect repellants should be carried out. Further research on all insect-bore diseases t the locality should be conducted i» relalon to environmentaljoolors.

Introduction

Rationale

Dengue fever is one of the most prevalent arbovirus infections that occur worldwide in the tropics and subtropics. The infection which is transmitted by mosquitoes results in fever, lymph node swellings and bleeding. It causes severe joint and muscle pains end is sometimes called breakbone fever. li can be fatal. lt occurs most often in children under age l, and recurrent infections and variant ypes of viruses are common in subsequent years.

Dengue fever has been in the news for the past six years with a serious outbreak in the Philippines. According to the World Health Organization (1998) some 2.5 billion persons, especially those inhabiting tropical and subtropical areas are endangered by dengue fever. lt was further slated that at least 10,000 Filipinos specially children fall victim to dengue. From January to June of 2003, there were 42 fatalities out of 2,213 cases of kids, **aged one** to 10, affected with the mosquito-bore viral disease. This is according to records obtained fom the National Epidemiology Center, an office uuder the Department of Health (W/omen's Journal, August 30, 2003).

Outbreaks of dengue fever occurred in several Asian countries for the pest two years. During the rainy season, dengue caes usully rise. The Department of Health has issued an alert waring that these strains of the dengue viruses ar circulating in Metro Manila and some provincs. Sinc the start of 2001, 1,895 dengue cases have been registered at the San Lazaro Hospital with 32 deaths. FiRy-three percent of the patients were from Metro Manila while the rest are from the provinces of Laguna, Nueva Ecija and Quezon.

Dengue cases in the Philippines would peak during and just afer the rainy season which stretches from.June to November. January to March is supposedly dengue-free period, but cass are still being reported during these

months. Thus, as observed, Dengue fever *is* an all year round disease. In tens of prevention and control, dengue vaccines **are not** available at the moment. The only viable way to decrease incidence is by controlling the principal vector - mosquito. Aconding to health authorities, an effective but very expensive way of eradicating Aedes aegypti is spraying insecticides using Ultra Light Volume (UiV) application for killing adult mosquitoes. Dengue *can* be prevented by controlling domestic larvae habitats; but only when people effectively clan up the areas in around their home can they prevent mosquito breeding. insecticide spraying is expensive and at best it should only be used in an emergency situation. Control must **be a** community effort because mosquitoes my fly from house to house. This means that dengue contrl cannot be done by the government alone.

Dengue fever, particularly life-threatening Dengue Hemorrhagic Fever, often occur as massive epidemics. Dengue spreads rapidly affecting many people during an epidemic, resulting in reduced work productivity, financial burdens brought by costly medical care, and most importantly causing the loss of lives.

This research study is then conceived and implemented with the hope that it will give a clear picture of the communities' knowledge and practices on the prevention and control of dengue fever. The result will be used as bsline information in intensifying campaigns on management strategies to break the chain of transmission of the dengue infection.

Objectives of the Study

This study aimed *to* determine the management strategies which are observed or practiced iu the control of dengue fever in locos Sur.

Specifically, it determined the following;

1. The occurrence of dengue fever from 2000 to 2002.
2. The respondents' background knowledge on dengue fever.
3. The respondents' management strategies in the control of dengue fever in terms of mosquito elimination and prevention from mosquito bites.
4. The relationship between the occurrence of dengue fever and the respondents' management strategies in terms of background knowledge of the disease, mosquito elimination and prevention of mosquito bites.

Revier of Reland Literature

'THc Natre of Teague: It Etiology and Occurrence. Dengue is a serioun anthropd viral disease, transmitted by the bite of **the mosquito, Aedes** aegypti nd it is a major health problem in the Philippines. It **is caused** by four antigenicslly distinct dengue virus erotypes nsmely; D), D2, D3, and D4. Urie antigens of the four dengue serypes were produced in C6/36 Aedes aleopictus cells. Dengue ours in two {orms: **dengue fevr and dengue** hemortagic fever. Dengue fever is a severe, flu like illness that affects older children and dults but rarely caues desth.

Dengue hemorrhagic fever (DHF) is a more severe form of dengue in which bleeding and occasional shocks occur and eventually leading to death. it is most serious in children. Persons suspected of having dengue fever or DHF musk see a doctor at one. Dengue/DHF is a deadly disease and early diagnosis ad treatment can save lives. Unless proper treatment is given promptly, the patient may go into shock and die (Information Shots from 1locos Sur Provincial Health Office). The symptoms of dengue vary according *to* the age ard general health of the patient. Infants **and** young children may **have fever** with measle-like rash which is difficult *to* distinguish from influenza, measles, malaria, infectious heptitis ad other diseases associated with fever. Older children and adults may have similar symptoms or symptoms ranging from mild ilinss to very severe diseases.

C@uatlve Agemt. Mosquitoes belong to an order of insects called Diptera, which includes he common house fly. Some species of mosquitoes in the genera Anophelens, Aedes and Culex are responsible for infecting human beings with diseases such *es* malaria, fileriasis and yellow fever. Mosquitoes have two pairs of wings, but their second pair of wings is reduced to short, peg-like structures called halteres. They have thin, long **bodies and** 3 pairs of extremely log legs. They also have scales along the veins of their wings and long beak-like, sharp sucking mouth parts called proboscis.

Female mosquitoes are ready to mate within a fw hours after reaching their sduit stage, and males are usually ready within 24 hours. Mating typically occurs on the ground. Tie tone *of* tho female wing beat attracts males and they grab the females with thir hind kegs. Mating among mosquitoes is related to their swarming habits, which in some species, but not all, is the preliminary behavior o matig. Swarming which lasts for 10-30 minutes usually occurs around sunset and near fences or other objects. The females of some mosquito specie alpo feed on blod, which (hey need in order For their overiesto mature and or their eggs to develop. The femak blood meal can take place before and after she has maled. Female mosquitoes detect their blood hosts partly through the sene of smell Or partly by oigut. The distance over which a uosquito can

detect a blood host can range from 20-90 feet (6-27 m). Research indicates that mosquitoes **are attracted** to hosts already under attack by other mosquitoes. Some adult male humans are more desirable *to* them than women or children. Human beings **are not** the only blood hosts that mosquitoes **attack.** This "vampire" of the insect world is known *to* fed on mammals, birds, lizards, fish, bats, and even caterpillars for its blood meal. (The Gale Eoyolopedia of Science, 2001).

Mosquitoes have four stages in their life cycle beginning with the egg, then the larva stage, followed by a pupa stage, and finaily adulthood. They deposit their eggs in a number of different environments depending on the particular species., While the larvae can only live in water, eggs are not always laid in water. Some species deposit their eggs in areas that may *not* be flooded for a number of years but the eggs can survive for several years until the next flood. Other species deposit individually on top of the water and others deposit eggs in groups on the water surface. These are called "rafs". When the eggs **are** first laid they are white in color, but they change to black and brown in a short time. From 30-500 eggs are laid at one time by femaies, depending on the species and most hatch in 2 or 3 days into aquatio larva. The life span of mature mosquitoes ranges from **a** few days to over a month depending on the species and the climate. Those living in hotter climates tend to have a shorter life span.

Adult mosquitoes of only a very few species are active between midnight and dawn; most species fly about, mate and fed at other hours. Certain group of Aedes and their relatives are active during the day, while most species of Anephels and Culex are crepuscular or nocturai. Usually the mosquito that fly and bite actively in the daytime also mate and lay eggs during the day, while those that fly and bite at night are aoctumal in their mating and egg laying habits.

Resting places are usually very important to adult mosquitoes. These locations arc usually difficult to find unless the mosquito habitually enters houses to rest. Laboratory studies have shown that light, temperature and humidity acting together at the same time are the principal factors of the environment that influence mosquito behavior. All mosquitoes have a cycle of abundance govemcd by seasonal changes in temperature and humidity. (Encyclopedia Americana, 1973).

Only the female mosquito seeks the blood of mat or that of animals for food. The female of most species requires the protein f the blood of man, animal or bird *to* mature its eggs. However, investigation: continue to reveal more species that are autogenous.

Control and Prevention. Dengue fever can be controlled or stopped through environmental management, clinical and biological control, personal

and physical protection (DOH, 1998). Children, tourists and travelers are usually at a higher risk of getting the disease. However, adults living in less dense areas are in danger too. Health experts claimed that crowded cities, ignorance and government neglect are changing the patterns of infection of this potentially fatal mosquito borne disease in Southeast Asia (Mangahas, 1993).

In the study of Pretacio (Daily Inquirer, August 8, 1996) revealed that health authorities admitted that one of the major causes of the spread of DF was poor sanitation and failure of the people to clean their surroundings. The OOH Secretary then, Carmencita Reodica confirmed that medical support and other basic services would not suffice to free the community of dengue fever and other transferable and dreaded disease unless people sincerely participate in cleaning their places.

Fogging fails to control the outbreak. This was the claim of Ting as cited by Abigania (2001). Aedes aegypti and Aedes albopictus larvae were found in containers in houses and in schools. Most of the cases were preschoolers and students who were bitten by mosquitoes either at their homes or schools. Fogging conducted in affected areas failed to contain the outbreak; instead a fourfold increase in the number of cases was noted affecting even areas with no previous dengue cases. This showed that fogging is not an effective measure for dengue control. A massive and sustained clean-up campaign is necessary to destroy mosquito breeding sites. In response to this outbreak, a massive IEC campaign was conducted in affected *areas*. Treatment centers were set-up near these sites and physicians were updated on the management of dengue cases. Following a massive clean-up campaign, surveillance showed a decrease in the number of cases.

Abigania (2001) found out in her study that the wearing of pajamas and the use mosquito nets when sleeping were practiced by the respondents at a high level. Applying mosquito repellents to exposed parts of tho body was practiced at an average level. However, the respondents had a low level of practice in the use of screened windows and doors.

Methodology

This study made use of the descriptive method of research. It was focused on the awareness, observation and practices of the respondents in the control of dengue fever specifically on the nature of dengue vector, etiology and causation; control of mosquito breeding; and prevention fro mosquito bites.

This study utilized a structured questionnaire checklist scaled as follows:

Norms	Descriptive Rating	Interpretation
2.41–3.0	Always	Very High
1.81–2.40	Oftentimes	High
1.21–1.80	Sometimes	Average
0.61–1.20	Rarely	Low
0 - .60	Never	Very Low

The purposive sampling technique was employed in the selection of respondents. The families identified with dengue cases based on records in the different health care agencies CY 2000-2003 were taken including the neighboring families. The 855 respondents were residents of the 23 municipalities of Ilocos Sur with recorded cases of dengue fever. The municipality of Salcedo was included as a target place considering that it is a neighboring town of Galimuyod with a dengue case.

Table 1. Distribution of respondents by municipality.

Municipality	Population
Sinait	35
Cabugao	20
San Juan	34
Magsingal	21
Sto. Domingo	23
San Ildefonso	27
Bantay	29
Vigan	99
Caoayan	66
Sta. Catalina	31
San Vicente	68
Santa	20
Narvacan	30
Nagbukel	30
Sta. Maria	35
Burgos	26
Candon	28
Sta. Lucia	37
Sta. Cruz	64
Tagudin	40
Galimuyod	30
Salcedo	26
Del Pilar	35
Total	854

The data gathered were treated using frequency counts, means and Point Biscrial.

Discussion of Results

Occurrence of Dengue Fever, CY 2000-2002

Table 2 presents the distribution of respondents by municipality with or without dengue cases and year of occurrence.

Table 2. Distribution of respondents in terms of the occurrence of dengue fever.

Municipality	Occurrence of Dengue		Year Dengue Occurred		
	With dengue cases	No dengue cases	2002	2001	2000
Sinait	4	31	1	2	1
Cabugao	3	17	I	I	I
San Juan	23	11	3	3	17
Magsingal	1	20	1	-	-
Sto. Domingo	3	20	1	-	2
San Ildefonso	2	25	t	1	-
Bantay	3	26	I	1	1
Vigan	14	85	3	5	6
Caoayaa	22	44	5	7	10
Sta. Catalina	13	18	1	5	7
San Vicente	26	42	2	10	14
Santa	4	16	1	2	1
Narvacan	9	21	2	4	3
Nagbukel	6	24	I	3	2
Sta. Maria	7	28	3	1	3
Burgos	5	21	3	2	-
Candon	3	25	I	1	1
Sta. Lucia	14	23	3	9	2
Sta. Cruz	23	41	11	7	5
Tagudin	11	29	4	5	2
Galimuyod	2	28	-	-	2
Salcedo	-	26	-	-	-
Del Pilar	I	34	-	1	-
Total	199	655	49	70	80
% of Total	23.30	76.70	24.62	35.18	40.20

Out of the 854 respondents from the 23 municipalities of Ilocos Sur, there were 199 or 23.30% cases of dengue lever. However, 655 or 76.70% of which showed that there was no occurrence of dengue fever in the family. It can be noted that there was no occurrence in Salcedo and the least occurrence with one (I) case each was in Magsingal and del Pilar.

Among the 199 families afflicted with the disease, the highest occurrence fell in 2000 with 80 cases or 40.20% and a declining trend followed in 2001 with 70 cases or 35.18% and lowest in 2002 with 49 cases or 24.62%.

A closer examination of the table identifies the five leading municipalities where dengue fever had occurred by year. In year 2000, San Juan ranked first with I7 cases; second was San Vicente with I4; third was Caoayan with 10; fourth was Vigan with 6 and fifth with 7 cases was Sta. Catalina. No occurrence was noted in Magsingal, San Ildefonso, Salcedo and Del Pilar.

The data shows a declining trend of occurrence in 2001, San Vicente which used to be second in rank became first after a year having l0 cases; followed by Sta. Lucia with 9 cases; Caoayan and Sta. Cruz with 7 cases each; end Narvacan with 4 cases. No occurrence was noted in the municipalities of Magsingal, Sto. Domingo, Galimuyod and Salcedo.

In the year 2002 which appeared to have had the least occurrence during the three-year period, the highest occurrence was in Sta. Cruz with 11 cases; then Caoayan with 5 cases; and with 3 cases each were: San Juan, Vigan, Sta. Maria, Burgos and Sta. Lucia.

Respondents' Background Knowledge on Dengue Fever

The description, etiology and disease causation of dengue fever as per understanding of the respondents is displayed in Table 3,

The respondents' level of background knowledge on dengue fever is shown in Table 3. The respondents had a high level of knowledge ($\bar{X}$ = 2.40) on the nature of the so called communicable disease. They had a very high level of awareness regarding its causation - mosquitoes bites ($\bar{X}$= 2.79); the vector's ideal larvae habitat is stagnant waters ($\bar{X}$ = 2.67) which are cool and shady places ($\bar{X}$= 2.53); the virus is transmitted in and around th: home ($\bar{X}$ =2.53); and the infected individual experiences intermittent fever ($\bar{X}$ = 2.48). The respondents were highly aware that the mosquito is Aedes agypti ($\bar{X}$ = 2.37) with black and white stripes ($\bar{X}$= 2.16), could transmit the vrus by its bite ($\bar{X}$ = 2.23) sipping infected hunan blood especially in the morning and sunset ($\bar{X}$ = 2.10) and the source of the blood meal becomes infected ($\bar{X}$ = 2.14). This

finding implies that the respondents were aware or informed about the nature, etiology and causation of dengue fever.

Table 3., Level of respondents' background knowledge on dengue fever.

Background Knowledge	X	DR
1. Dengue fever is caused by mosquito bites.	2.79	Very High
2. The causative agent is a mosquito called Aedes Aegypti.	2.37	High
3. The vector has black and white stripes.	2.16	High
4. The water's ideal larvae habitat is stagnant water.	2.67	Very High
5. The dengue transmission occurs in and around the home.	2.53	Very High
6. Dengue vectors rest in cool and shady places.	2.53	Very High
7. Dengue is spread by the bite of a female vector on a person who is ill with dengue.	2.53	High
8. The infected mosquito transmits the disease by biting other people who in turn become ill, and the chain of infection continues.	2.14	High
9. The dengue vector bites early morning and at sunset.	2.10	High
!0. The child with dengue experiences high fever intermittently.	2.48	Very High
Asa Whole	2.40	High

Management Strategies

Mosquito Elimination. Table 4 presents the practices and observations of respondents on how to contro! the proliferation of mosquitoes in their place.

The respondents observed and practiced mosquito elimination (($\bar{X}$ = 1.80) to control the occurrence of dengue fever. They highly observed certain practices like covering water containers tightly ($\bar{X}$ = 2.40), smashing and burying garbage articles and rubbish ($\bar{X}$ = 2.40), removal of garbage articles and other rubbish found around their houses and to prevent rain from getting collected ($\bar{X}$ = 2.39) and participating in a 4 o'clock habit of cleaning ($\bar{X}$ = 1.92). Moreover, the following were observed at an average level like covering and sealing septic tanks and soak away pits ($\bar{X}$ = 1.80), spraying of chemicals and fogging ($\bar{X}$= 1.64), and planting neem tree in their backyards ($\bar{X}$ = 1.48). On the other hand, the following were observed at low level: distributing 3 A's *(asin,* alcohol and *aceite)* to canals and known areas with stagnant waters ($\bar{X}$= I.14) and using insects to eradicate mosquitoes ($\bar{X}$ = 1.04). This finding implies that there are measures or strategies that are highly feasible for them, not so costly and could be done primarily as a routine household activity. There are strategies that are sometimes or even rarely observed because they involve

money, the way it is implemented is somewhat complex for a layman to do. The use of neem tree to drive away mosquitoes is not a common knowledge.

Table 4. Level of the respondents' management strategies in the control of dengue fever along mosquito elimination.

	Mosquito Elimination	X	DR
1.	Covering water containers tightly	2.40	High
2.	Covering and sealing septic tanks and soak-away pits	1.80	Average
3.	Removal of garbage articles and other rubbish that collect rainwater found around houses	2.39	High
4.	Smashing and buying of garbage articles and rubbish	2.40	High
5.	Spraying of chemicals (sulfac powder) in and out of the house (fogging)	1.64	Average
6.	Participating in a "4 o'clock habit" of cleaning	1.92	High
7.	Distributing 3 A's *(asin,* alcohol, and *aceite)* to canals and known areas with stagnant waters	1.14	Low
8.	Planting neem tree in backyards	1.48	Average
9.	Use of insects (lizard, tilapia, etc) to eradicate mosquitoes	1.04	Low
	Asa Whole	1.80	Average

Prevention from Mosquito Bites. Table 5 exhibits the respondents' level of management strategies in the control of dengue fever in terms of mosquito bite prevention.

Table 5. Level of respondents' management strategies in the control of dengue fever in terms of preveation from mosquito bites.

	Prevention of Mosquito Bites	X	DR
I.	Putting screen on windows and doorways	1.42	Average
2.	Use of mosquito coils and electric vapor	1.90	High
3.	Use of mosquito nets over sleeping places	2.26	High
4.	Use of *OffLotion*	1.19	Low
5.	Use of smoke *(ubuob)*	1.24	Average
6.	Use of electric fan	2.10	High
7.	Use of pajama or lay dresses to cover the skin	2.01	High
8.	Spraying *Baygon* and other insecticides	1.86	High
9.	Use of electric mosquito killer	0.94	Low
10.	Putting leaves *[neem (Azadirachta indica), lagundi (Vitex negundo), kakawate (Gliricidia sepium)]* under the bed, chairs and tables.	0.90	Low
	As a Whole	1.58	Average

The practices of the respondents for mosquito bite prevention in the control of dengue fever was at average level ($\bar{X}$ = 1.58). The following measures were done by the respondents to get rid of mosquito bites like: use of mosquito nets during sleep ($\bar{X}$ = 2.26), electric fans ($\bar{X}$ = 2.10); pajama or lay dresses to cover the skin ($\bar{X}$ = 2.01); mosquito coils and electric vapor ($\bar{X}$ = 1.90); and spraying of Baygon ($\bar{X}$ = 1.86). This finding implies that people ofter,times applied these management strategies as a means of driving away the mosquito and/or to cover their skin to prevent bites. These practices are not so costly and could be a routinary activity and also these are highly advocated during the outbreak of mosquito-borne diseases.

The things that were practiced or observed at average level were the following: using screen for windows and doorways ($\bar{X}$ = 1.42) and burning leaves to produce smoke ($\bar{X}$ = 1.24). These strategies were not so very practical for them because considering the respondents' economic status not all of them can afford to install screens over their windows and doors for the purpose of barring mosquitoes from entering. Producing smoke was sometimes done but was considered an uncomfortable practice due to the odor that could stick over clothing and garments and could suffocate the family members especially the kids with respiratory problems.

There were also practices observed at low level like the use of *OffLotion* ($\bar{X}$ = 1.19), electric mosquito killer ($\bar{X}$ = 0.94) and putting *[neem (Azadirachta indica), lagundi (Vitex negundo), kakawate (Gliricidia sepium)]* leaves under the bed, chairs and tables ($\bar{X}$ = 0.90). The first two strategies were rarely used as means of preventing mosquito bites because of the cost. Aside from these practices being expensive, the respondents believed that not all mosquitoes roaming around could be killed by the electric mosquito killer and some mosquitoes are resistant to *OffLotion*. Hence, these practices cannot eliminate all mosquitoes.

Relationship between the Occurrence of Dengue Fever and the Level of Management Strategies

Table 6 shows the occurrence of Dengue fever and its relationship to the respondents' level of knowledge and practices in terms of background knowledge of the disease, elimination of mosquito breeding and prevention from mosquito bites.

Table 6. The relationship between the occurrence of dengue fever and the **level of management strategies.**

Variables	Value of r-b	Value of t	Decision	Interpretation
Background knowledge	.07	1.75	Ho is rejected	Significant
Elimination of mosquito breeding	.03	0.75	Ho is accepted	Not significant
Prevention from mosquito bites	.09	1.25	Ho is rejected	Significant

Table 6 reveals the relationship between the occurrence of dengue fever and the level of management strategies. It can be analyzed from the data that the occurrence of dengue fever was significantly related to the respondents' knowledge of the disease and as to how they practiced or observed management strategies in the prevention from mosquito bites as backed-up by the computed value of .07 and .09 respectively. This finding implies that the more conscientious the people are in observing matters that would keep them free from mosquito bites, the lesser the chance for dengue fever to occur. Using things that would drive the mosquito away from them could really serve as a protective measure against infectious bites.

On the other hand, the elimination of mosquito breeding strategies did not significantly influence the occurrence of dengue fever as evidenced by the computed value .03 which failed to surpass the t-value at .05 probability level. This finding may mean that even if the people observed what had been advised for them to do to combat the proliferation of mosquitoes there were still other places suitable for mosquitoes to lay their eggs considering the mobility of the insect. For as long as there is one survivor, it can multiply and can be a vector of dengue fever, thus dengue fever may occur despite of the observance or non-observance of the mentioned strategies.

Conclusions

Based on the aforementioned findings, the following conclusions were drawn:

1. The occurrence of dengue fever was highest in 2000 and the number of cases declined through years 2001 and 2002. The municipaiity found to have had the highest occurrence during the 3-year period

was San Vicente and the lowest number of cases was recoded in Magsingal and del Pilar. Dengue fever never occurred in Salcedo.

2. The respondents had a high level of background knowledge relative to the characteristics or nature of the dengue vector, the etiology and disease causation.
3. The respondents bad an average level of management strategies in terms of controlling mosquito breeding and proliferation. Some practices were highly observed because they were part of household activities. But there was a low level of practice for costly procedures like use of electric mosquito killer and Off Lotion, which were also regarded as impractical.
4. The use of preventive materials and devices to get rid of mosquito bites were practiced/observed at average level. However, the costly strategies for bite prevention were accepted at low level.
5. The higher the level of background knowledge of the respondents regarding dengue fever, the lower would be the occurrence of the disease. A more conscientious application of the management strategies for the prevention from mosquito bites significantly lowers the occurrence of dengue fever.
6. Management strategies in the elimination of mosquito breeding do not significantly affect the occurrence of dengue fever. Considering the mobility of the mosquitoes they can travel instantly to other places safer for them to multiply.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are hereby forwarded:

1. A regular radio program on Health and Nutrition in all radio stations in the locality should be carried out as an extension service of the University. The program should focus on the nature. causation, etiology, preventive measures and management of complications of communicable and non-communicable diseases. More intensive IEC activities should be conducted when there is an outbreak of insect-borne diseases like dengue fever.

2. Massive cleaning activities should be conducted especially in possible breeding places for mosquitoes in and around the houses, school rooms and grounds. A close coordination between the *barangay* officials, school staff and *barangay* health workers ensures community participation.

3. The fogging practice with sulfac powder as a program of the government to be more effective in the control of mosquito should be done simultaneously in neighboring *barangays* at a close interval so that mosquitoes that tend to fly and seek refuge to the other *barangays* could not go **away** from the fumes and could not build more resistance, thereby they eventually die.

4. Intensive campaign in the use of management strategies against mosquito bites like the use of mosquito nets, pajamas or long dresses, electric fans and spraying of insect repellents should be carried out. The installation of screen over windows and doorways, use of fumes of burned cheesecloth and leaves (*"ubu-ob"*), putting *[neem (Azadirachta indica), lagundi (Vitex negundo), kakawate (Gliricidia sepium)]* leaves in dark places where mosquitoes stay and thrive should be encouraged. School children should be advised to wear pants for them to get protected from mosquito bites when they are in and around the school.

S. Further research on all insect-borne diseases in the locality should be conducted in relation to environmental factors.

References

ABIGANIA, M. V. A. *Factors Affecting the Severity Level of Dengue Fever in Metro Wigan.* 2001. Unpublished MA Thesis, University of Northern Philippines.

BERKOW, R., et. al. *The Merck Mamual of Medicinal Information. Home Edition.* New York. Mereck and Co., inc. 1997.

Information Sheets of Provincial Health Office.

MANGAHAS, M. *Changing Patterns of Dengue Fever Infection in Southeast Asia.* Philippine Daily Inquirer. April 25, 1993.

The Gale Encyclopedia of Medicine. Vol. 2. USA. Gale Research. 1999.

The Gale Encyclopedia of Science. 2nmd Ed. Vol. 4. Canada. Gale Group. 2001

The New Book of Popular Science. Vol. 4. Connecticut. Grolier Incorporated. 1996.

SPIRA, A. *Dengue Fever: The Travel Medicine Center*. Beverly Hills. California. 1998

Women's Journal. August 30, 2003