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# Knowledge, attitudes and practices on dengue and Zika viruses from four institutional divisions of Cebu normal university, Cebu city, Philippines

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**Abstract**
A cross- sectional study was conducted among the faculty, administrative staff and undergraduate and graduate students of Cebu Normal University in order to determine their level of knowledge, attitudes, and practices towards dengue and zika virus symptoms and transmission from September 1, 2016 up to December 15, 2016. From each division, 50 respondents were chosen at random and made to answer the respondent's self- made questionnaire. The findings showed that except for the members of the administrative staff, the 3 other groups had good knowledge regarding dengue symptoms. All the 4 groups showed a moderate knowledge of mosquitoes, zika symptoms and transmission. The findings also showed no linear relationship between knowledge of dengue symptoms and attitudes and there was no correlation between knowledge and practice. Such a result indicated that there was a need to identify effective strategies on how to translate knowledge into good practice.

**Keywords:** Dengue, zika virus, Cebu Normal University

## Introduction
*Aedes aegypti* and *Aedes albopictus* (Order Diptera: Family Culicidae) are dengue and Zika-causing species. The diseases are obtained from bites of female mosquitoes. Since 2014, the number of confirmed dengue fever (DF) and zika virus (ZIKV) infection increased in the Pacific Islands [1, 2, 3]. From then on, Zika disease outbreaks were recorded in Africa, the Americas, Asia and the Pacific [2]. In Asia, ZIKV was first isolated from the *Aedes aegypti* mosquito in 1966, and the first human infections were reported in 1977 in Central Java, Indonesia [4, 5, 6]. In the Philippines, 57 cases of the Zika virus were also recorded, where 7 victims were pregnant but all of them gave birth to full- term babies without microcephaly [7]. ZIKV infection is a mild febrile disease where the common symptoms are characterized by fever, skin rashes, conjunctivitis, muscle and joint pain, malaise and headache. Other arbovirus infections also include dengue, yellow fever, West Nile, and chukungunya [7, 8]. Zika is alarming to pregnant women because of its direct connection to giving birth to babies with microcephaly (a birth disorder where babies are born with abnormally small heads). Also, Brazil reported its first case on the association between the Zika virus and Guillian- Barre' syndrome, a rare autoimmune disorder which attacks the peripheral nerves and CDC reported that GBS is strongly associated with the Zika virus [5, 9]. DF and Severe Dengue (SD) are mosquito-borne viral diseases which are closely related viruses of the genus *Flavivirus*, namely: DENV-1, DENV-2, DENV-3 and DENV-4 [1, 2, 16, 17]. They are commonly reported in tropical and sub-tropical countries with serious, acute and fatal reported cases globally [1, 2, 3, 10]. Dengue is endemic in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths among children [18].
The Philippines had also the seventh highest number of dengue fever cases in the world between 2004 and 2010 [15, 18, 19]. As of January, 2017, a total of 38, 233 cases were reported nationwide. As to geographic distribution, Region 7 has the highest reported cases (15.1%) followed by Region 3 (12.5%), and the National Capital Region [NCR] (12.3%). The age group which has the highest death is the 5-9 years old (0.86%) age group [20]. In Cebu, the top dengue areas include Cebu City, Mandaue City, Lapu- lapu City, and Toledo City-all of these

places reported similar number of deaths [20, 21]. In Cebu City, the highest number of reported cases is from barangay Guadalupe (87), while in barangay Kalunasan and barangay Mambaling, 3 persons have died of the disease [21]. But despite all the efforts of DOH, DEPEd and different LGUs, raising community awareness, and spearheading cleanliness and sanitation programs these are not enough to contain the disease [15, 16] since the Philippines is considered as one of the "high risk" zones of dengue. Lately, in order to reduce cases of death among children, DOH- Central Visayas started the anti-dengue vaccination to 9-14 year old children. However, total reliance on vaccination alone will not warrant complete cases of death among children, DOH-Central Visayas started the anti-dengue vaccination to 9-14 year old children. However, total reliance on vaccination alone will not warrant complete eradication of these mosquito-related diseases due to specific reasons. This includes complicating factors present in a tropical country (i.e. endemicity of dengue cases, poverty, climate change, environmental degradation, lack of water supply, poor housing conditions and poor implementation of garbage collection [22, 23]. Therefore, vaccination should be supplemented with vector population reduction worldwide. At present, there are no data regarding knowledge, attitudes and practices of undergraduate and graduate students, faculty, and administrative staff of Cebu Normal University (CNU). Recognizing the need of the school community to reduce mosquito breeding sites is important to know and analyse their level of knowledge, attitude and practices which would be the basis for the effective implementation of Integrated Vector Control Program through the participation of the 4 sectors of the institution.

## Research Objectives

This study aims to (a) evaluate the knowledge, attitudes, and practices of the undergraduate and graduate students, the faculty and administrative staff of Cebu Normal University and (b) recognition of *Aedes aegyptii* and *Aedes albopectus* mosquitoes and/ or preventive measures contribute to better preventive practices and (c) identify if the knowledge, attitudes and practices have a positive impact on the spread and/ or prevention of the virus.

## Research Methodology

The study was conducted in Cebu Normal University, Osmeña Bouelavard, and Cebu City. The study was conducted based on a cross- sectional survey of four (4) institutional divisions of Cebu Normal University, Cebu City: (1) undergraduate students, (2) graduate students (3) faculty and 4) administrative staff. The study was conducted from September 1, 2016 - December 15, 2016. In each division 50 respondents were chosen. A researcher made self-administered questionnaire was prepared, validated and used to collect data regarding the knowledge, attitudes and practices concerning DF and ZIKV from the 4 institutional divisions of the university. Data were collected from the 4 institutional divisions of the university on knowledge, attitudes and practices regarding dengue and zika viruses using an interviewer- administered questionnaire. The study instrument was developed following an extensive review of literature. To measure the level of knowledge on dengue and ZIKV symptoms and their transmission, descriptive statistics of mean, standard of error measurement and standard deviation were used. Analysis of variance was then utilized to determine the significant difference of the different groups at p=0.05. This was followed up with a pairwise technique in order to identify paired differences among the groups. The last statistical tool was the Pearson r correlation coefficient. This technique determined if the knowledge on zika and dengue symptoms and transmission were associated with the group's attitudes and practices.

## Results

### Knowledge of Dengue Symptoms and Zika Symptoms, and Mosquitoes, Dengue and Zika Transmissions

The study was conducted from September 1, 2016 up to December 31, 2016. 50 respondents from each division: undergraduate students, graduate students, faculty and administration of Cebu Normal University were interviewed where a total of 200 respondents in all answered the tool. Table 1 showed the results on knowledge of dengue, zika symptoms, and mosquitoes, dengue and ZIKV transmission. Based on the results of the study, the undergraduate students scored the highest on knowledge of dengue symptoms with a mean score of 80%, interpreted on the scale as very high. On the other hand, the administrative staff scored 61.33% which was moderately high. Graduate students and faculty scored 73.56% and 73.33%, respectively. In Table 1, the undergraduate students were very knowledgeable on symptoms of dengue like fever, muscle pain, rashes, nose bleeding and excessive thirst. The graduate students and the faculty were also knowledgeable on dengue symptoms, while the administrative staff scored the lowest.

**Table 1:** Knowledge on dengue and zika symptoms, and on mosquitoes, dengue and zika transmission.

| Division | Dengue Symptoms | | | Zika Symptoms | | | Mosquitoes, Dengue and Zika Transmission | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | SEM | SD | Mean | SEM | SD | Mean | SEM | SD |
| Undergraduate Students | 80.00 | 2.77 | 19.57 | 48.00 | 4.35 | 30.77 | 68.00 | 4.31 | 30.48 |
| Graduate | 73.56 | 3.09 | 21.87 | 45.20 | 4.34 | 30.72 | 54.00 | 4.11 | 29.05 |
| Faculty | 73.33 | 3.52 | 24.90 | 42.00 | 4.58 | 32.39 | 61.43 | 3.35 | 23.67 |
| Admin Staff | 61.33 | 4.03 | 28.51 | 40.40 | 4.52 | 31.94 | 45.71 | 4.40 | 31.08 |

Scale: 81-100= Very High; 61-80= High; 41-60= moderate/average; 21-40= Low 01-20= very Low

**Table 2:** Statistical difference of knowledge of dengue symptoms

| Division | Dengue Symptoms | | | p-Value | Decision |
|---|---|---|---|---|---|
| | Mean | SEM | SD | | |
| Undergraduate | 80.00 | 2.77 | 19.57 | 0.000 | Reject the null hypothesis |
| Graduate | 73.56 | 3.09 | 21.87 | | |
| Faculty | 73.33 | 3.52 | 24.90 | | |
| Admin Staff | 61.33 | 4.03 | 28.51 | | |

Table 2 showed the statistical difference on knowledge of dengue symptoms (p=0.000), indicating that there was no significant difference on their knowledge of dengue symptoms. The results showed that the undergraduate students had significantly higher knowledge compared to other groups, namely the graduate, faculty and administrative staff. This meant that the school exposure of the undergraduate students may have led to the significantly higher knowledge level. Given the school setting they were in, the education they received had contributed to the knowledge of students which was missing in the environment of the other groups.

**Table 3:** Statistical difference of knowledge on ZIKV symptoms.

| Division | ZIKV Symptoms | | | p-Value | Decision |
|---|---|---|---|---|---|
| | Mean | SEM | SD | | |
| Undergraduate | 48.00 | 4.35 | 30.77 | *0.655* | *Retain the null hypothesis* |
| Graduate | 45.20 | 4.34 | 30.72 | | |
| Faculty | 42.00 | 4.58 | 32.39 | | |
| Admin Staff | 40.40 | 4.52 | 31.94 | | |

As to the knowledge of ZIKV symptoms, all the four divisions scored more or less the same as followed, 48% undergraduate, 45.20% graduate students, 42% faculty and 40.40% for the administrative staff. The interpretation of this result in the knowledge scale was moderate/ average. At p=0.655, the results showed that there was no significant difference in the knowledge of ZIKV symptoms among the four groups. This implied that the groups may not have differed in terms of how knowledgeable they were with regard to zika symptoms.

**Table 4:** Pairwise comparison of the level of knowledge on zika symptoms.

| Paired Groups | Test Statistic | Standard Error | p-Value |
|---|---|---|---|
| Faculty & Admin Staff | 24.810 | 11.495 | 0.185 |
| Grad Stud & Admin Staff | 32.460 | 11.495 | 0.028 |
| Undergrad & Admin Staff | 49.090 | 11.495 | 0.000 |
| Faculty & Grad Stud | 7.650 | 11.495 | 1.000 |
| Faculty & Undergrad | 24.280 | 11.495 | 0.208 |
| Grad stud & Undergrad | 16.630 | 11.495 | 0.888 |

When the groups were paired with one another, the only significant difference of the paired groups was found between the graduate students and admin staff (t=32.46; p=0.028) and between the undergraduate students and administrative staff (t=49.09; p=0.000). This implied that when compared, there was a significant difference in terms of the level of knowledge among graduate students and administrative staff. It can be inferred that the graduate students have a significantly higher level of knowledge compared to the administrative staff. The significantly high difference can be traced to the higher level of academic learning which the graduate students are exposed to. Moreover, given the high scores observed among the undergraduate group, the difference in the level of knowledge on zika symptoms was apparent. When grouped together, the values of their mean revealed a real difference on how knowledgeable each group was when it comes to the knowledge about the symptoms present in zika. Between the two groups, the undergraduate students were more exposed to classroom topics such as dengue and zika being integrated in science classes.

**Table 5:** Statistical difference of knowledge of mosquitoes, dengue and zika transmission.

| Division | Mosquitoes, Dengue and Zika Transmission | | | p-Value | Decision |
|---|---|---|---|---|---|
| | Mean | SEM | SD | | |
| Undergraduate students | 68.00 | 4.31 | 30.48 | 0.001 | Reject the null hypothesis |
| Graduate | 54.00 | 4.11 | 29.05 | | |
| Faculty | 61.43 | 3.35 | 23.67 | | |
| Admin Staff | 45.71 | 4.40 | 31.08 | | |

As to the knowledge on mosquitoes, dengue and zika transmission, findings showed the highest mean score obtained by the students was 68% while the lowest was obtained by the administrative staff which was 45.71%. These results were consistent with the scores they obtained in knowledge of dengue symptoms. Results showed that the level of knowledge among the groups can be seen as different where the undergraduate group was on a higher level of knowledge while the administrative staff had a significant indication of the lowest knowledge level (p=0.001).

**Table 6:** Pairwise comparison of the level of knowledge on mosquito, dengue and zika transmission

| Paired Groups | Test Statistic | Standard Error | p-Value |
|---|---|---|---|
| Grad Stud & Admin Staff | 15.350 | 11.428 | 1.000 |
| Faculty & Admin Staff | 26.700 | 11.428 | 0.117 |
| Undergrad & Admin Staff | 44.750 | 11.428 | 0.001 |
| Faculty & Grad Stud | 11.350 | 11.428 | 1.000 |
| Grad Stud & Undergrad | 29.400 | 11.428 | 0.061 |
| Faculty & Undergrad | 18.050 | 11.428 | 0.685 |

As depicted in Table 6, pairwise comparison of the level of knowledge on mosquito, dengue, and zika transmission showed a significant difference between the undergraduate students and administrative staff. When the groups were paired with each another, the results revealed that there was a real significant difference among the undergraduate students and administrative staff (t=44.75; p=0.001) in terms of level on knowledge on mosquito, dengue and ZIKV transmission. Through comparison, it can be seen that the undergraduate group had a significantly higher level of knowledge compared with the administrative staff. When the other groups were paired, there was a hesitation if the differences in their knowledge level were significantly real

**Attitude and Practices toward Dengue and Zika**

**Table 7:** Attitudes and practices toward dengue and ZIKV.

| Division | Attitude Towards Dengue and Zika | | | Practices Towards Dengue and Zika | | |
|---|---|---|---|---|---|---|
| | Mean | SEM | SD | Mean | SEM | SD |
| Undergraduate | 2.513 | 0.101 | 0.716 | 3.298 | 0.079 | 0.561 |
| Graduate | 2.707 | 0.076 | 0.540 | 3.418 | 0.075 | 0.529 |
| Faculty | 2.817 | 0.088 | 0.620 | 3.186 | 0.099 | 0.703 |
| Administrative Staff | 2.553 | 0.116 | 0.822 | 3.250 | 0.127 | 0.901 |

Scale: 4.00- 3.26- very good, 3.25-2.51 good, 2.50-1.76- moderate/ average, 1.75- 1.00- poor

As to attitude towards dengue and zika, the faculty scored the highest (2.817), followed by the graduate students, 2.707, 2.553 and 2.513 for the administrative staff and the undergraduate students respectively. Based on the scale, all the groups have a good attitude towards dengue and zika. As to practices towards dengue and ZIKV, the highest mean score was 3.418 of the graduate students and the lowest, 3.186, by the faculty. The undergraduate students scored 3.298, whereas the administrative staff scored 3.250. All of these scores were interpreted as good, based on the rating scale.

**Table 8:** Statistical difference of group attitude towards dengue and zika.

| Division | Attitude | | | p-Value | Decision |
|---|---|---|---|---|---|
| | Mean | SEM | SD | | |
| Undergraduate | 2.513 | 0.101 | 0.716 | 0.270 | Retain the null hypothesis |
| Graduate | 2.707 | 0.076 | 0.540 | | |
| Faculty | 2.817 | 0.088 | 0.620 | | |
| Admin Staff | 2.553 | 0.116 | 0.822 | | |

**Table 9:** Statistical difference of group practices towards dengue and zika

| Division | Practices | | | p-Value | Decision |
|---|---|---|---|---|---|
| | Mean | SEM | SD | | |
| Undergraduate | 3.298 | 0.079 | 0.561 | 0.295 | Retain the null hypothesis |
| Graduate | 3.418 | 0.075 | 0.529 | | |
| Faculty | 3.186 | 0.099 | 0.703 | | |
| Admin Staff | 3.250 | 0.127 | 0.901 | | |

In terms of the attitudes among the groups, it can be seen that they were not significantly different. At p=0.270, the results implied that the attitudes among the groups seemed similar. Moreover, with regard to practices of dengue and zika prevention, it was revealed that the groups were not significantly different and that the groups' practices were similar to those of another (p=0.295). In Table 10, the relationship between Knowledge of Dengue and Knowledge of Zika symptoms were considered to be significantly direct (r=0.520; p=0.000). It meant that higher knowledge of dengue symptoms corresponded with a higher knowledge of Zika symptoms. This result implied that whenever there was an increase in the knowledge of symptoms of dengue, an increase in the knowledge of zika also increased, and vice versa. Dengue and zika are caused by the same mosquito, *Aedes aegypti* and this explains why knowledge of their symptoms were related [16, 17]. But, knowledge of symptoms, attitudes and practices were not related to one another in terms of the dengue and zika conditions. This showed that knowledge was only associated between dengue and zika symptoms but not with the others such as transmission, attitudes and practices. Practices towards dengue and zika transmission was not related to knowledge (r=-0.124; p=0.390) as well as practices towards dengue and zika transmission and attitudes towards dengue (r=0.208; p=0.147).

### Relationship between Knowledge, Attitude and Practices

**Table 10:** Relationships between knowledge, attitude and practices.

| | Knowledge of Dengue symptoms | Knowledge of Zika symptoms | Knowledge of Mosquitoes, Dengue and Zika Transmission | Attitudes Toward Dengue |
|---|---|---|---|---|
| Knowledge of Zika symptoms | r = 0.520*** p-value = 0.000 | | | |
| Knowledge of Mosquitoes, Dengue and Zika Transmission | r = 0.036$^{ns}$ p-value = 0.805 | r = 0.128 $^{ns}$ p-value = 0.376 | | |
| Attitudes Toward Dengue | r = -0.150 $^{ns}$ p-value = 0.297 | r = -0.060 $^{ns}$ p-value = 0.677 | r = 0.064$^{ns}$ p-value = 0.658 | |
| Practices Toward Dengue and Zika Transmission | r = -0.131 $^{ns}$ p-value = 0.366 | r = -0.124 $^{ns}$ p-value = 0.390 | r = -0.214 $^{ns}$ p-value = 0.135 | r = 0.208 $^{ns}$ p-value = 0.147 |

### Discussion

One possible reason for the high knowledge of the undergraduate students and the graduate students of dengue symptoms are the many programs undertaken by the Department of Education (DepEd) regarding wide dissemination and information campaigns regarding the disease. Cebu Normal University (CNU) is a teacher education institution and most of the students in the graduate school are teachers who are involved in these programs. DepEd launched many programs that included the observance of Dengue Awareness month held in June every year and the Association of Southeast Asian (ASEAN) Day on June 15 each year. Activities such as lectures, poster making and school- wide campaigns are undertaken by different agencies. These programs will not only remind the students of the ill effects of the disease but also will provide them of the recent updates on the disease [15, 16, 17]. Another anti–dengue program implemented by DepEd is the 4's which means 1.) Search and destroy mosquito breeding places, 2.) Use self-protection measures, 3.) seek early consultation for fever lasting for more than 2 days and 4.) Say yes to fogging when there is an impending outbreak. Lastly, the dengue health advisory, done by the school nurse or the municipal health officer, is the best program that provides the widest information campaign regarding the disease. The use of visual aids and other educational materials are aimed at advising students regarding the disease process and the manifestations of the disease. These programs provide knowledge to students, faculty and graduate students, which is the reason why these groups scored high on dengue symptoms [17].

As to the knowledge about zika symptoms, all the four groups have a moderate knowledge. Information about Zika is not as widely disseminated as dengue considering the newness of the disease in the country. In the Philippines, the first index case of Zika was identified in Ilo-ilo. DOH also reported 57 cases of Zika. Zika is transmitted by mosquitoes found in tropical and subtropical regions, namely *Aedes aegypti* and *Aedes albopectus* (tiger mosquito), the same mosquito that spreads dengue. The virus caused a light case of flu, joint pain, and muscle pain. The disease is strongly suspected of causing birth defects such as microcephaly and other birth deformities, that is why pregnant women are advised to be vigilant of the disease. ZIKV is not as deadly as dengue except to pregnant women, so people are not so alarmed over it. Moreover, the highest score was obtained by the undergraduate students and one of the possible reasons, for this is the many programs undertaken by DEpEd like the Preventive Alert System in School (PASS). Under the PASS program, each student will monitor the well-being of his own classmate. They are instructed to report to their teacher if someone among their classmate is not feeling well, or has cough, fever or colds. The students notify their classroom adviser, and if confirmed, the school principal will notify the family/ guardian or municipal health officer in case the school does not have a physician or nurse. This is a very systematic way of monitoring the student's health status. The learning the student gets from this program while still in the elementary and secondary levels are carried over to their present knowledge. These activities of DEpEd are done yearly as a reminder to students and teachers because of the possible break out of the disease, most especially during the rainy months. However, the administrative staff whose respondents were purposely for janitors, cleaners, gardeners, carpenters and other ground workers scored the lowest. These workers possibly had information about dengue and zika symptoms and their transmission but do not absorb this information and forget most of it. Besides, these groups of workers were not much related to the classroom and the academe.

Although other literatures indicate that dengue awareness and knowledge had a significant association with the practice of dengue prevention [9, 13], one of the important findings of this study is that there is no relationship between knowledge of dengue mosquitoes and attitudes and knowledge and preventive practices (r=-0.214; p=0.135) (Table 10). These research findings were consistent in the study of Lozano et al. (2018) and Yboa and Labrague (2013) where knowledge about dengue did not translate into positive attitudes and improved preventive measures [10, 14]. Except for the administrative staff, the 3 other divisions had a good knowledge of dengue and zika symptoms and their modes of transmission. Although respondents were aware that dengue mosquitoes breed in stagnant water, old habits continue to predominate which cause repetitive occurrence of dengue and zika virus transmission. Since dengue awareness was not translated into good practice, it is therefore important to intensify anti-dengue campaigns among different task forces such as DEpEd, DOH, DSWD and LGU, both in Cebu City and Cebu Province, to completely eradicate dengue-related problems. Other preventive measures that should be practiced include: (1) elimination of all breeding sites in the school, at home and in the community, (2) consistent practice of cleaning the surroundings (i.e. cleaning blocked canals and esteros), (3) eradication of possible breeding sites, (4) proper disposal of waste and (5) medical attention if fever lasts for 2 days or more.

## Conclusion

Except for the administrative staff, it is concluded that undergraduate students, graduate students, and the faculty members have a good knowledge of dengue symptoms; all the four divisions, however, have an inadequate knowledge of zika symptoms. This significant difference between the undergraduate and graduate students and the administrative staff on knowledge of mosquito, dengue and ZIKV transmission reveal the importance of intensified awareness not just among public schools but should also be cascaded in public and private institutions. Further, it was also found out that the good knowledge from the 3 sectors of the university was not translated into good practice. There is a need to translate knowledge into positive action in order to help reduce the spread of dengue and Zika virus.

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