

## Efficacy of Implementing Educational Program on Pregnant Women's Knowledge and Practices Regarding Preventive Measures of Dengue Fever

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### Abstract

**Background:** Dengue is spread through the bite of an infected mosquito. A pregnant woman already infected with dengue can pass the virus to her fetus during pregnancy or around the time of birth. Dengue can have harmful effects, including death of the fetus, low birth weight, and premature birth. **Aim:** To determine the efficacy of implementing educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever. **Subjects and method: Design:** A quasi-experimental research design was used to fulfill the aim of this study. **Setting:** The study was conducted in the Antenatal Outpatient Clinics at Mansoura University Hospital. **Subjects:** Based on the non-probability purposive sampling technique, a sample of 100 pregnant women was selected. **Three tools were used:** Tool (I) structured interview questionnaire, Tool (II) pregnant women's knowledge regarding preventive measures of dengue fever, and Tool (III) pregnant women's reported practice regarding preventive measures of dengue fever, (pre/post). **Results:** A statistically significant difference was detected between pregnant women's level of knowledge and practice regarding preventive measures of dengue fever after implementing the educational program. Also, the study demonstrated that there was a highly statistically significant correlation between pregnant women's knowledge and practice regarding preventive measures of dengue fever at ( $P = <0.001$ ) after implementing the educational program. **Conclusion:** implementing educational program has a positive effect on improving pregnant women's knowledge and practice regarding preventive measures of dengue fever. **Recommendations:** Implementing an educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever is recommended in various maternity healthcare settings. Educational booklets should be provided about dengue fever for pregnant women, in addition to replication of the current study with a larger sample of patients undergoing cardiac surgery in different settings is required for generalizing the results.

**Keywords:** Educational program, Knowledge and practice, Pregnant women & preventive measures for dengue fever.

### Introduction:

The bite of a mosquito carrying the dengue virus transmits the disease. When a woman becomes pregnant or nears delivery, she may transfer the dengue virus to her unborn child. Premature birth, poor birth weight, and fetal death are only a few of the negative outcomes of dengue. Dengue is spread via the bite of an infected mosquito. A fetus can contract dengue from an already-infected pregnant mother either during pregnancy or shortly before delivery. A few of the

detrimental effects of dengue are early birth, low birth weight, and fetal mortality. The World Health Organisation (WHO) formerly divided dengue into three disease categories: dengue shock syndrome (DSS), dengue fever (DF), and dengue hemorrhagic fever (DHF) (WHO, 2021).

People can contract dengue (also known as break-bone fever) from mosquitoes. Tropical and subtropical areas are where it is more prevalent. The majority of dengue cases result in no symptoms. For those who do, though, a

high temperature, headache, body aches, nausea, and rash are the most typical symptoms. Most will heal within a week or two as well. A hospital is necessary for treatment in cases of severe dengue. Dengue can be lethal in extreme circumstances. The majority of dengue patients experience little to no symptoms and recover in one to two weeks. Dengue can seldom be fatal due to its severe form. If symptoms appear, they usually do so 4–10 days after infection and persist for 2–7 days. High fever (40°C/104°F), excruciating headache, discomfort behind the eyes, aches in the muscles and joints, nausea, vomiting, swollen glands, and rash are some of the possible symptoms. People who contract dengue virus for the second time are more likely to experience severe symptoms. Severe abdominal pain, continuous vomiting, fast breathing, bleeding gums or nose, exhaustion, restlessness, blood in the vomit or stool, extreme thirst, pale and chilly skin, and weakness are common symptoms of dengue that appear after the fever has subsided (WHO, 2021).

Painkillers can be used at home to treat the majority of dengue fever cases. The most effective method of avoiding dengue is to avoid mosquito bites. Dengue does not have a specific treatment. Treating pain symptoms is the main goal. Pain management sometimes involves the use of paracetamol (paracetamol). Because they raise the risk of bleeding, non-steroidal anti-inflammatory medicines (NSAIDs) such as aspirin and ibuprofen should be avoided. For those who reside in areas where dengue is prevalent and have had the disease at least once, there is a vaccination known as Dengvaxia. Hospitalization is typically necessary for those suffering from severe dengue (Harapan et al., 2023).

Dengue appears to be the arboviral disease that spreads the fastest worldwide. According to The Global Burden of Illness, the incidence of dengue has increased six-fold, with 52% of the illness burden coming from Southeast Asia. 50 million to 100 million cases are estimated to occur annually by the World Health Organisation (WHO) (Wilder et al., 2019). The WHO reports that from January 1 to February 2, 2019, the total number of cases in

Malaysia increased by 157% over the same period in 2018. Furthermore, as of the end of July 2019, 79,151 dengue cases had been reported countrywide; more than 50% of these cases (n=40,849, 51.6%) were reported from Selangor state. The cornerstone of dengue prevention tactics continues to be vector control and surveillance because there is no specific treatment for the disease and vaccination remains a non-viable option (WHO, 2021).

In addition to maternal transmission, mosquito vectors are the main means by which DENV is spread among humans. Nonetheless, there is proof that maternal transmission—transmission from a pregnant woman to her fetus—may occur. Vertical transmission rates, however, seem to be modest, and the timing of the dengue infection during pregnancy appears to be associated with the likelihood of vertical transmission. Preterm birth, low birth weight, and fetal distress are possible outcomes for newborns whose mothers have a DENV infection during pregnancy (Nguyen, 2019).

Therefore, effective vector management requires an awareness of the baseline knowledge and practices (KAP) of dengue in the community. Dengue prevention requires an equal emphasis on health education (Horstick et al., 2021). Therefore, it is crucial to provide basic information about dengue and its preventive measures in addition to assessing the community's awareness of the disease. The general population in Selangor, where the current study was conducted, has positive attitudes towards dengue prevention and a good understanding of dengue, according to earlier research (Al-Dubai et al., 2019).

Dengue is a virus that is carried by vectors and is one of the most common ones. It spreads quickly. Up to 20% of people who develop severe dengue die from the disease, which is spread by the bite of female *Aedes aegypti* mosquitoes, which are the primary vector and secondary vector, respectively. Throughout the previous 20 years, the number of dengue cases reported to the World Health Organisation (WHO) has increased tenfold, from 505,430 cases in 2000 to over 2.4 million cases in 2010 and 5.2 million cases in 2019. The

number of reported deaths rose from 960 to 4032 between 2000 and 2015 (**WHO, 2022**).

Dengue is expected to cost the world between USD 8.9 billion and USD 39.3 billion, not considering the costs of treating the disease or lost productivity. The management of dengue fever mostly depends on vector control, which involves minimizing contact with vectors that carry dengue viruses, and adequate disease management. This is because there are currently no drugs specially designed to treat dengue viral infection. In endemic or partially endemic nations, personal and home preventive measures include employing mosquito coils and nets, routinely emptying stagnant water, and applying repellents to deter mosquitoes among the means of controlling vectors (e.g., sprays and creams). Community-based techniques like mosquito fogging and the Wolbachia program are also essential to vector control. A naturally occurring bacterium called Wolbachia inhibits the capacity of infected *Aedes* mosquitoes to spread dengue or other viruses carried by vectors. To manage the dengue burden, more methods are required in addition to vector control (**Harapan et al., 2023**).

Individuals' knowledge of dengue sickness and prevention, as well as their practices on immunization, personal prevention, and community vector management, were assessed using the Knowledge and Practices (KAP) framework. National and international vaccine technical advisory committees (e.g., WHO, US Centres for Disease Control and Prevention (CDC)) are increasingly acknowledging the importance of KAP studies in shaping new vaccine recommendations and policy. To improve knowledge about dengue fever and how to prevent it, KAP (**Hesaraki et al., 2021**).

At least one of the following symptoms must be present to diagnose dengue with warning signs: exhaustion, prolonged vomiting, fluid accumulation, bleeding from the mucosa, liver enlargement, and rising hematocrit with falling platelets. Severe dengue symptoms include considerable plasma loss, severe bleeding, and organ failure. There have been conflicting findings from studies examining the health impacts of dengue during pregnancy, and

these effects remain poorly understood (**Paixao et al., 2019**). There is a higher chance of death, thrombocytopenia, hemorrhagic presentations, preterm birth, miscarriage, and stillbirth. The bulk of research examining the relationship between dengue and pregnancy uses data from referral health services. The addition of more serious instances to this study could lead to a selection bias (**Friedman, 2018**).

By adopting some preventative measures, such as keeping mosquitoes at bay, dengue can be avoided. Since stagnant water is ideal for mosquito breeding, empty any gathered still water from pots, vases, or cans in the vicinity of your house. Wear loose, long sleeves, remain in cool places, apply insect repellent, and use bed nets to protect yourself from mosquito bites. Preventing dengue is always preferable. Put on protective clothes, such as long sleeves and trousers, and use insect repellent that contains icaridin (Picaridin). In other regions of the world, it is more readily available. Nevertheless, protection is not appreciably increased by employing intensities higher than 50% (**Ribeiro et al., 2020**).

Pregnancy should be protected by avoiding travel to dengue-risk locations. More than 100 countries, particularly tropical ones, have a high prevalence of dengue. Apply an insect repellent that has received EPA registration. Put on long trousers and shirts with sleeves. Opt for lodging that has screens on its doors and windows. If there is air conditioning, use it. Take action to keep mosquitoes out of the house and surrounding areas. Included were prevention and control. Reduce the chance of contracting dengue by wearing clothing that covers as much of your body as possible, using window screens, mosquito repellents, mosquito nets if you sleep during the day, and preferably, nets sprayed with insect repellent (containing DEET, Picaridin, or IR3535) as well as vaporizers and coils. When you have dengue, it's crucial to stay hydrated, rest, take acetaminophen (paracetamol) for discomfort, stay away from non-steroidal anti-inflammatory medications like aspirin and ibuprofen, keep an eye out for severe symptoms, and get in touch with your doctor right away if you do (**WHO, 2021**).

Use insect repellents containing one of the following active chemicals that are registered with the Environmental Protection Agency (EPA). Extended protection is offered by higher active ingredient percentages. EPA-registered insect repellents are safe and effective when used as prescribed, even for expectant and nursing mothers. DEET, IR3535, Oil of lemon eucalyptus (OLE), Picaridin (also known as KBR 3023 and icaridin outside of the US), and Para-menthane-diol (**Harapan et al., 2023**).

When using insect repellents, exercise caution, especially on young children. Pay close attention to what the label says and follow it. Wear garments treated with an icaridin-containing insect repellent since mosquitoes can bite through delicate fabrics. Icaridin doesn't damage plastics or synthetic fabrics and is less likely to irritate skin. Use insecticide-treated bed nets (mosquito netting), such as deltamethrin or permethrin, while you sleep. Apply insect repellent to the parts of the house where people sleep (**Shafique et al., 2022**).

There is no particular vaccination or medication for the treatment of dengue. Dengue during pregnancy is treated the same as any other illness. A pregnant patient can be asked to have a blood test by the doctor. Since paracetamol is thought to be safe for pregnant women, it may be advised to treat the fever if the test results are positive. Additional testing was indicated to determine the infection level before beginning therapy. Drink plenty of water and fresh juices, etc., to avoid dehydration from vomiting, as maintaining the embryonic fluid level depends on being hydrated. Painkillers and antibiotics are recommended by doctors to manage muscular or joint discomfort. Taking over-the-counter medications such as aspirin and similar ones for dengue during pregnancy is not safe (**Barroso et al., 2020**).

Pregnant women with severe conditions may need to be taken to the hospital and given fluids via a drip to prevent dehydration and stabilize blood pressure. Regular monitoring of blood pressure, oxygen levels, platelet counts, and intravenous fluid may be performed, with platelets possibly being infused in extreme

cases. A blood transfusion may also be necessary if there is excessive bleeding (**Barroso et al., 2020**).

Obstetric and community nurses play a vital role in supporting expectant mothers who seek early diagnosis from medical professionals. They can also help with weekly tasks like covering, emptying, and cleaning household water storage containers; properly disposing of solid waste; eliminating artificial mosquito breeding sites like car tires, fruit cans, and plastic bags from the environment; draining standing water in the home; and educating the public about mosquito control (**Ribeiro et al., 2020**).

### **Significance of the study:**

Dengue is a virus conveyed by the bite of many *Aedes* mosquito species, endangering the health of about half of the world's population. It is more common in tropical and subtropical regions, even if climate change has caused it to gradually expand to southern Europe and US states. Up until now, there hasn't been much solid evidence linking the virus to worse delivery outcomes following pregnancy, even though many instances are asymptomatic. The virus can produce a mild to severe flu-like illness and, in rare cases, even death (**Ribeiro et al., 2020**).

Dengue outbreaks in Egypt were reported in 1799 in Cairo and Alexandria]. In 1937, 2594 human cases were recorded in Cairo. DENV has been largely controlled in Egypt by focusing on the eradication of its mosquito vector, *Aedes aegypti*, following the introduction and intense usage of the DDT insecticide. In 2011, DENV was unexpectedly detected in two Italian tourists returning from South Egypt. In 2015, a DENV resurgence occurred in the Dairoute District of the Assiute (Assiut) Governorate, with at least 253 cases. In 2017, two cases of DENV were reported in travelers returning to Moscow, Russia, from Hurghada, Egypt, on the Red Sea coast. In the same year, a DENV outbreak with at least 680 cases occurred in the Red Sea Governorate and were confirmed (**World Health Organization, 2022**). In the last decade,

DENV outbreaks have occurred in the Red Sea region, Yemen, Sudan, Djibouti, and Saudi Arabia. Three human prevalence studies for DENV were identified. Seroprevalence in healthy male university students was 0.3% in 1969 and was absent in the serum samples of children with acute febrile illness in 1968 in Alexandria. This gap in the literature has existed for half a century. In Sohag and Assiut in 2019, the positive rates of DENV antibodies in the general population aged 40 years old were 25%, 11.32%, and 10%, respectively, and 3.30% in local camels (Hussen & Sayed, 2020).

The population's knowledge, attitudes, and practices around dengue, together with the regular implementation of sustainable vector control operations in the community, all influence the community's susceptibility to dengue. As a result, in tropical and subtropical regions, disease risks may fluctuate in response to climate change, and vectors may adjust to new environmental conditions. The study, which was published in the American Economic Journal: Applied Economics, found a connection between a decrease in the average birth weight of neonates and mild to moderate dengue fever during pregnancy. The effect was shown in newborns at the lowest end of the birth weight scale, where the incidence of low, very low, and extremely low birth weights increased by 15%, 67%, and 133%, respectively (Shafique et al., 2022). Due to the limited information on the effect of dengue during pregnancy, despite the high prevalence of this illness, no well-designed studies are looking at the prevalence of psychiatric symptoms in patients with Dengue. There is thus an urgent need to conduct such studies to determine the efficacy of implementing educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever.

#### **Aim of the study:**

This study aimed to determine the efficacy of implementing educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever

#### **Research hypothesis:**

**H<sub>1</sub>.** Pregnant women' who receive educational program regarding dengue fever experience an improvement in the knowledge levels regarding preventive measures of dengue fever post-implementation than before.

**H<sub>2</sub>.** Pregnant women' who receive educational program regarding dengue fever experience an improvement in the practice levels regarding preventive measures of dengue fever post-implementation than pre-implementation.

#### **Subjects and Methods:**

##### **Research design:**

A quasi-experimental research design was used to fulfill the aim of this study.

##### **Setting:**

The study was conducted in the Antenatal Outpatient Clinics at Mansoura University Hospital.

##### **Sample:**

Based on the non-probability purposive sampling technique, a sample of 100 pregnant women was selected. The following criteria were used to choose the pregnant women who participated in this study:

##### **The inclusion criteria were:**

- Ranging in age from 20 to 35.
- They agree to participate in the study
- Pregnant women in the second trimester

##### **The exclusion criteria were:**

- Refused to participate.
- Women who are pregnant who have mental illness or chronic conditions

##### **Sample size calculation:**

The power analysis level of significance of 0.95(=1-0.05=0.95) at alpha.05 (one-sided) with a big effect size (0.5) was used to determine the sample size, with 0.001 being utilized as the high significance level.

**Tools of data collection:**

**Three tools were used** in this study as follows:

**Tool (I):- A structured interview questionnaire;** it consists of 7 items divided into two parts.

**Part I:** It was used to collect personal data of the pregnant women which included the following 4 items: age, educational level, occupation, and place of residence.

**Part II:** It was used to collect information regarding obstetric history and had three items: gravida, parity, and gestational age.

**Tool (II): Pregnant women's knowledge regarding dengue fever (pre/post):** It was developed by the researchers after reviewing the related literature and research studies (WHO, 2021; Governo et al., 2020; Barroso et al., 2020; Ministério et al., 2019): It was created by the researchers and has fifteen multiple-choice questions within it. It was used to gauge the knowledge of pregnant mothers on dengue illness such as definition, types, causes, signs and symptoms, Transmission, Risk factors, Mosquito vectors of dengue fever, Breeding sites of mosquitoes, Who should be responsible for mosquito control. Biting time of mosquitoes, prevention, treatment, source of information

**Scoring system:**

Pregnant women who chose one of the options (yes) received two points, while those who checked one of the options (no) received one point and those who checked one of the options (don't know) received one point (0). Furthermore, the following categories were used to group the women's overall knowledge scores. The overall knowledge score was out of 15, with 15 being the highest and 0 being the lowest. For those who received a score between 0 and 8, the knowledge score was deemed to be poor knowledge (<60%), and for those who had a score between 8 and 15, the knowledge score was deemed to be satisfactory knowledge (≥ 60%).

**Tool (III):- Pregnant women's practice**

**regarding preventive measures of dengue fever, (pre/post):** The researchers created it following a thorough analysis of the pertinent literature (WHO, 2021; Barroso et al., 2020); to determine the degree of pregnant women's reported practice: It was created by the researcher after evaluating pregnant women's practice regarding preventive measures of **dengue fever**. It had ten multiple-choice questions (MCQs) on topics such as seeking the advice of a health professional for early diagnosis; covering, emptying, and cleaning domestic water storage containers every week; disposing of solid waste properly and removing artificial man-made mosquito breeding sites (vehicle tires, fruit cans, plastic bags) from the environment; drainage of water collection points around the house; and raising community awareness for mosquito control. It included questions about What you do in the first stage of fever. At home, what do you do in the first stage of fever? Do you store water at home? If yes, do you frequently change the stored water until it runs out?, and What measures do you take to prevent mosquito bites?

**Scoring system:**

The reported practice questions were in MCQ format, with a total score of 10 for the five elements; the right answer scored a 1, while the incorrect answer received a 0. If pregnant women reported their practices at a rate of greater than 60%, their practices were deemed adequate according to the method of total reported practices. - Pregnant women whose reported practices fell below 60% were considered to have inadequate practices.

**Validity of the tools:**

Five experts—two community professors and three professors in the field of obstetrics and gynecology nursing—reviewed the tools' content validity as well as their clarity, comprehensiveness, appropriateness, and relevance. To guarantee sentence clarity and content appropriateness, no changes were made by the panel judgment.

**Reliability of the tools:**

The first tool's reliability was ( $r = 0.93$ ),

the second tool's reliability was ( $r = 0.94$ ), and the third tool's reliability was ( $r = 0.89$ ).

### **Fieldwork:**

Starting in December 2023 and continuing through February 2024, the researchers made three daily visits to the locations they had previously chosen, from 9 a.m. to 12 p.m. All the interview tools took about thirty to forty minutes to complete.

### **Pilot study:**

A first investigation: Pilot research was done on 10% (10 pregnant women) of the sample to evaluate the practicality and clarity of the data-gathering instruments. The tools changed to create their ultimate shape. Women who were expecting were part of the pilot study.

### **Ethical considerations:**

The study's goal was explained to the directors of the chosen setting, and their participation was obtained before the researchers started the investigation. The Faculty of Nursing, Mansoura University, received ethical approval from its institutional review board. Informally, consent was obtained to secure the cooperation of pregnant women. The aim of the research as well as the expected outcomes were declared. We told the expectant mothers about the goals of the study. The selected study participants will be informed that their involvement in the study is entirely voluntary and they are free to withdraw from the study at any time, for any reason. They were also told that the information they provided would be kept private and used only for study.

### **Administrative design:**

Administrative permission was obtained through an issued letter from the Mansoura University Director of the previously selected setting to achieve this study.

**The actual study was divided into three phases:**

**Phase I: Preparatory phase:** Formal approval was gained for data collection once the investigation's objectives were communicated to

the research directors. Consent was provided to all participants in the trial who were pregnant. Books, essays, periodicals, and magazines were used to undertake a review of the literature on the many parts of the concerns from the past and the present, both locally and globally. After reviewing pertinent contemporary Arabic and English literature, programs were established in the Arabic language to address various aspects of the study issue designed to close knowledge and practice gaps among pregnant women.

**Phase II: Implementation phase:** To initiate discourse, the researcher introduces herself and goes over the study's objectives during the initial interview. To determine her degree of knowledge and habits, each study participant filled out a pre-and post-test. After giving each pregnant woman around 15 minutes to complete this questionnaire on her own, the researchers evaluated each one separately.

Before every interview, the two guys were met and given an introduction by the researcher. After obtaining their informed consent, she went on to outline the objectives and scope of the study. Before distributing the instructional guidelines and assessing personal data, the researcher performed a face-to-face pre-test using structured questions. Simple, understandable information on dengue disease was incorporated in the educational guidelines. Additionally, it involved creating instructional resources including PowerPoint presentations, films, and images. After the sessions, two pregnant males were given an Arabic pamphlet created by the researchers that included instructional tips regarding dengue illness. Each session lasted between forty and fifty minutes, with three sessions covering theoretical information and one session covering practice. The subject contents were presented in this order.

### **Contents of sessions**

Session 1: All researchers discussed the material from the educational guidelines session before moving on to the next session's learning objectives. The researchers initially evaluated the pregnant women's knowledge and practice while conversing in Arabic which was simple for them to understand.

Session 2: The theoretical section covered what pregnant women should know about dengue fever, including its definition, kinds, causes, symptoms, indicators, and transmission. danger signs, insects that spread dengue disease, locations where mosquitoes breed, Who ought to be in charge of controlling mosquitoes? Mosquito biting duration, treatment, prevention, and information source

Session 3: contains a role-play regarding the practical aspects, like personal hygiene and managing fever at home. Additionally, utilize mosquito repellent equipment, simulate storing water at home, and change it periodically. Employ window screens, bed nets, insect-repellent creams, fans, smoke, and clothing to ward off mosquitoes. You should also clear up trash and dispose of water-holding containers, cover water containers at home, and cover your body when outdoors.

Session 4: To continue therapy and avoid consequences, the researchers discussed the requirement of follow-up care and how referrals are necessary for serious difficulties.

### Phase III: Evaluation phase:

Using the same pretest data collection instruments, a post-test was conducted one month later to evaluate the effectiveness of an educational program on pregnant women's knowledge and habits on dengue fever preventive measures.

### Statistical analysis:

Version 20 of the SPSS statistical program was used to analyze the data. Before and after the intervention, continuous data were collected, and the results were reported as mean standard deviation (SD). Numerical and percentage methods were used to express categorical data. To look at differences between each group before and after the intervention, a paired t-test was employed. To investigate changes in anxiety levels, a one-way repeated-measures analysis of variance (ANOVA) was employed. The Mann-Whitney test was used to test variables that deviated from the parametric assumptions. The chi-square test was used to assess the relationship between two variables in

the case of noncontiguous data. A P value of less than 0.05 was necessary for statistical significance.

### Results:

Table (1): Shows that 70% of pregnant women aged between 20 < and 30 years with mean± SD 28.22 ± 5.33, (40%) of them had basic education, meanwhile, and also, it is pointed out that 70% of pregnant women were not working. Finally, (65%) of them lived in rural areas.

**Figure (1):** Presents that (60%) of the pregnant women were multigravida and (40%) were primigravida.

**Figure (2):** Illustrates the **Parity distribution** of the studied pregnant women, It was noticed that (55%) of the pregnant women were multipara, (24%) of them were primipara, and (21%) of them were nullipara.

**Figure (3):** Shows that 55% of the studied pregnant women were between 20 weeks and 25 weeks and 45% of them were between 25 weeks and 30 weeks.

**Figure (4)** highlights that the common source of information among the studied pregnant women was doctors (50%) about preventive measures for dengue fever.

**Table 3** shows that there was a highly statistically significant improvement in the knowledge means scores of the pregnant women regarding preventive measures of dengue fever pre and post-implementing educational program.

**Figure (5):** Portrays that there were statistically significant improvements in all items of pregnant women's total knowledge pre and post-educational **program** implementation. Additionally, it demonstrates that 18 of them had a satisfactory knowledge level regarding dengue fever pre-educational **program** implementation which increases to 80% post-educational **program** implementation

**Figure (6):** Demonstrates statistically significant improvements in all items of pregnant women's total practices pre and post-



implementation educational program. Also, it illustrates that 10% of the pregnant women had adequate practice level regarding dengue fever pre-implementation educational program which improved to 83% post-implementation educational program.

**Table 4** shows that there was a highly statistically significant improvement in the practice means scores of the pregnant women regarding preventive measures of dengue fever pre and post-implementing the educational program.

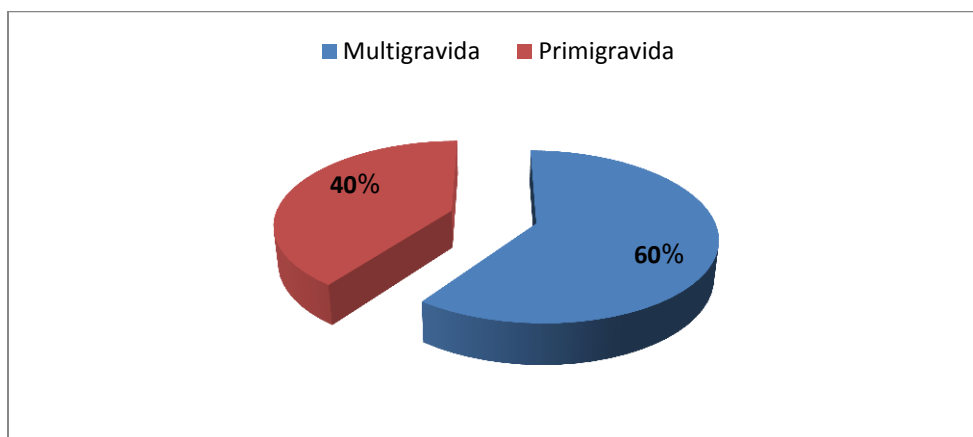
**Table (5):** Shows a correlation ( $r = -0.558$ , P value 0.001) between the knowledge and educational level of the pregnant women in the

study. Additionally, there was a weak negative correlation ( $r = -0.346$ , P value .018\* and  $r = -0.506$ , P value .001) between pregnant women's residence, occupation, and practice.

**Table 6,** As described in the table, there was a highly statistically significant positive correlation between the studied pregnant women's total mean scores of knowledge and practice before the program as ( $r = 0.253$ ) at  $p < 0.001$ . Besides, a statistically significant positive correlation was detected between the studied pregnant women's overall mean scores of practice and knowledge post-implementation educational program ( $r = 0.116$ ) at  $p < 0.05$ .

**Table (1): Demographic characteristics of studied pregnant women (n=100)**

Items	No.	%
<b>Age in years</b>		
20 < 30	70	70.0
30 < 40	30	30.0
<b>Mean ±Stander deviation</b>	27.13 ± 4.67	
<b>Educational level</b>		
- Illiterate	14	14.0
-Basic education	40	40.0
-Secondary education	23	23.0
-University education	23	23.0
<b>Occupation</b>		
- Working	30	30.0
- Not working	70	70.0
<b>Residence</b>		
- Rural	65	65.0
- Urban	35	35.0



**Figure (1): Gravidity distribution among the studied pregnant women (n=100)**

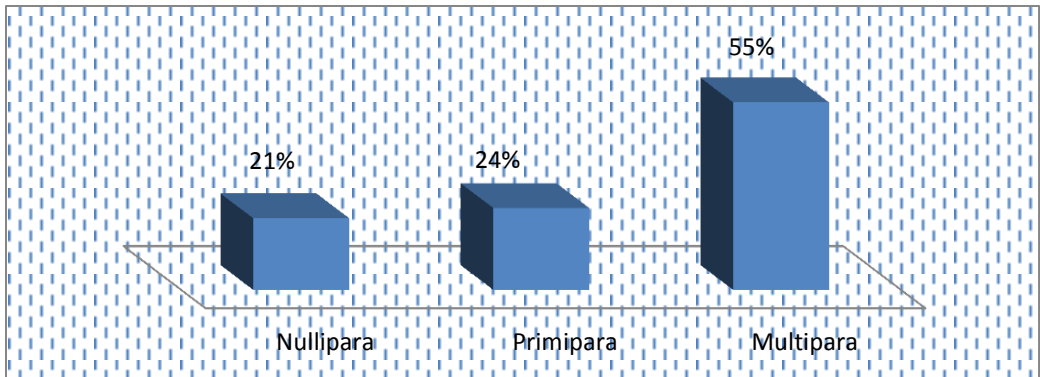


Figure (2): Parity distribution among the studied pregnant women (n=100)

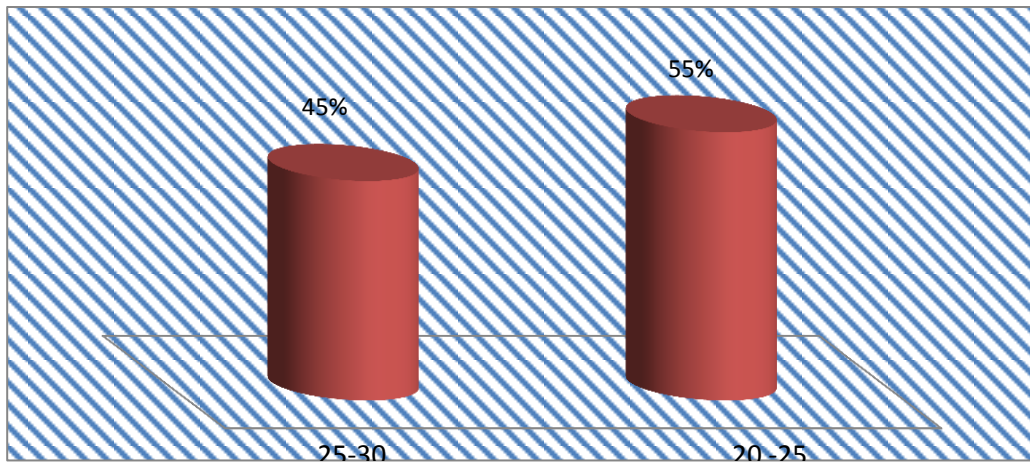


Figure (3): Gestational age distribution among the studied pregnant women (n=100)

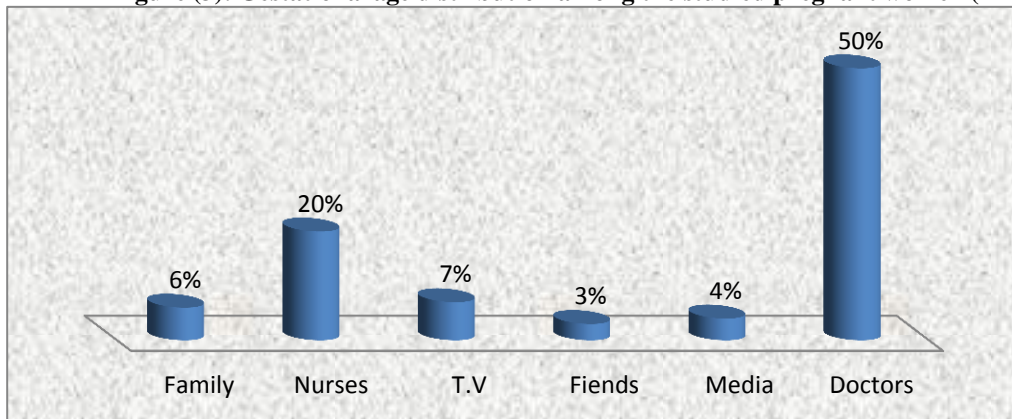
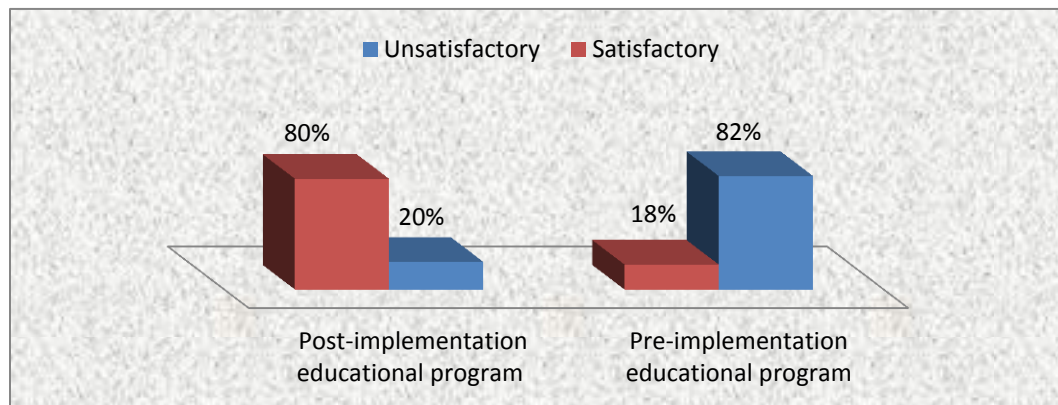


Figure (4): Source of information about preventive measures for dengue fever of the studied pregnant women (n=100)

**Table (3) Comparison between the mean score of studied pregnant women's knowledge regarding preventive measures of dengue fever pre and post-implementation educational program (n=100).**

Variable	Pre- Pre- implementing educational program	Post - Post- implementing educational program	Paired t-test	P-value
	Mean $\pm$ SD	Mean $\pm$ SD		
Definition of dengue fever	.44 $\pm$ .53	1.95 $\pm$ .61	16.5	<0.001
Types of dengue fever	.72 $\pm$ .33	1.65 $\pm$ .57	19.6	<0.001
Causes of dengue fever	.46 $\pm$ .49	1.39 $\pm$ .34	15.7	<0.001
Signs and symptoms	.73 $\pm$ .48	1.76 $\pm$ .46	17.8	<0.001
Risk factors of dengue fever	.50 $\pm$ .47	1.46 $\pm$ .47	9.06	<0.009
Transmission of dengue fever	.69 $\pm$ .44	1.17 $\pm$ .42	18.2	<0.001
Management of dengue fever	.56 $\pm$ .40	1.68 $\pm$ .40	19.5	<0.001
Prevention of dengue fever	.38 $\pm$ .48	1.77 $\pm$ .33	13.7	<0.001



**Figure (5): Total knowledge level regarding preventive measures of dengue fever among the studied pregnant women pre and post-implementation educational program (n=100).**

**Table (4) Comparison between the mean score of studied pregnant women's practices regarding preventive measures of dengue fever pre and post-implementation educational program (n=100).**

Variable	Pre- Pre- implementing educational program	Post - Post- implementing educational program	Paired t-test	P-value
	Mean $\pm$ SD	Mean $\pm$ SD		
Personal cleaning	.74 $\pm$ .20	1.22 $\pm$ .47	13.9	<0.001
Fever control at home	.75 $\pm$ .60	1.66 $\pm$ .35	12.7	<0.001
Storing water at home	.56 $\pm$ .60	1.77 $\pm$ .41	16.3	<0.001
Use mosquito-repellent equipment	.47 $\pm$ .61	1.42 $\pm$ .31	19.2	<0.001
Use mosquito-repellent creams	.78 $\pm$ .50	1.67 $\pm$ .38	18.6	<0.001
Use bed nets	.59 $\pm$ .41	1.53 $\pm$ .39	7.09	<0.001
Use window screens	.73 $\pm$ .21	1.24 $\pm$ .37	15.8	<0.001
Use a fan to drive away mosquitoes	.57 $\pm$ .61	1.71 $\pm$ .35	16.3	<0.001
Use smoke to drive away mosquitoes	.36 $\pm$ .50	1.63 $\pm$ .33	13.6	<0.001
Cover the body with clothes	.55 $\pm$ .42	1.52 $\pm$ .44	9.05	<0.001
Cleaning of garbage/trash	.78 $\pm$ .20	1.26 $\pm$ .52	17.6	<0.001
Frequently changes in the stored water	.39 $\pm$ .49	1.64 $\pm$ .33	11.5	<0.001

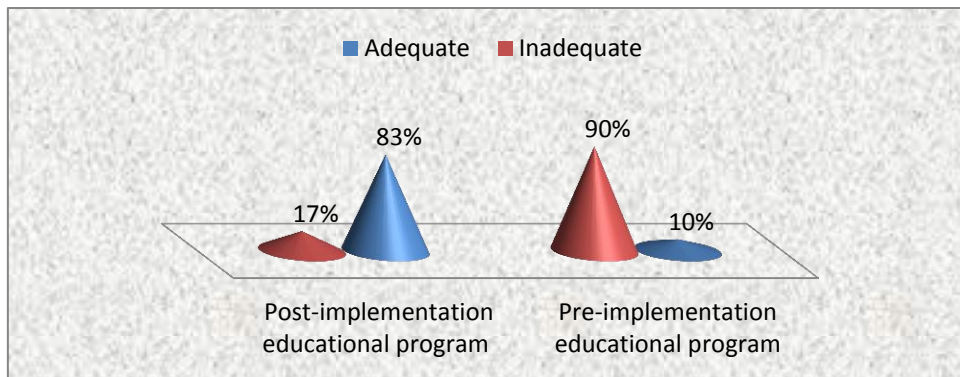


Figure (6): Total practice level regarding dengue fever among the studied pregnant women pre and post-implementation educational program (n=100).

Table (5): Correlation between total knowledge, practice, and their demographic data among the studied pregnant women (n= 100)

Items		Knowledge	Practice
Age	R	-.123-	-.103-
	P – value	.367	.439
Educational level	R	<b>-.558</b>	.024
	P – value	<b>.001**</b>	.875
Occupation	R	.076	<b>-.346</b>
	P – value	.612	<b>.018*</b>
Residence	R	.048	<b>-.506</b>
	P – value	.756	<b>.001**</b>

\*\* . Correlation is significant at the 0.01 level\*. Correlation is significant at the 0.05 level

Table (6): Correlation between total mean scores of knowledge and practice among the studied pregnant women pre and post-implementation educational program (n=100).

Items	Practice			
	Pre- implementing educational program		Post implementing educational program	
	R	P	R	P
Knowledge	0.253	0.000**	0.116	0.062*

r: Pearson coefficient. \*: Statistically significant at p < 0.05.

\*\* : Highly statistical significant at P< 0.001.

**Discussion:**

There have been eight times as many instances of dengue as there were in the preceding 20 years. This resurgence of dengue virus serotype 2 (DENV-2) could be the cause of the current increase in cases (Governo et al., 2020). Both the formation of severe disease types and greater exposure of at-risk groups, such as pregnant women, can happen as soon as there is such an expressive increase. A feverish illness known as DENV infection can result in anything from mild instances to fatalities. People in Brazil who have a fever and at least two of the following symptoms—rash, myalgia, headache, retroorbital pain, petechiae,

leukopenia, or a positive tourniquet test—as well as a relevant epidemiological exposure, should be checked for DENV infection (Ministério et al., 2019). Regardless of the severity of dengue, the health services recommend in-hospital management for all pregnant women (Shafique et al., 2022).

A few preventative measures (Picaridin) can help avoid dengue (Ribeiro et al., 2020). It has been found that pregnant women's environmental awareness and practices have a significant impact on dengue vector transmission (Pai et al., 2020). Hence, the researchers conducted this study to determine

the efficacy of implementing educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever.

The results of this study indicated that the majority of the pregnant subjects were in the age range of 20 to 30. The knowledge and resource disparities that are more pronounced in rural than in urban regions may be attributed in part to this. The Department of Health (2022) reported that while the results of Raheel et al.'s descriptive survey of "Dengue Fever in the Indian Subcontinent" in **Rio de Janeiro (2019)** were similar to theirs, they were lower than those of other series in French Guiana.

The results of this study demonstrated that among half of the pregnant women under investigation, doctors were the primary source of information regarding dengue fever preventive measures. According to the researchers, it demonstrated the importance of medical advice. This finding is consistent with a study conducted by **Swaddiwudhipong et al. (2018)**, which discovered that respondents' main sources of information on the disease were health professionals and workers. This suggests that the level of mobilization of health professionals in this field for awareness-raising initiatives is insufficient. This may indicate the significance of focusing upcoming educational initiatives on these crucial locations to modify people's behavior and successfully reflect on knowledge, attitude, and practice. Furthermore, there should be a stronger emphasis on the fundamentals of epidemiology and infectious disease prevention in the healthcare professional education system. This will significantly increase the expertise of doctors who can change the world by volunteering to educate the public.

In contrast, the findings of a study by **Rahman et al. (2020)** titled "Climate Change and Dengue Fever Knowledge, Attitudes and Practises in Bangladesh" indicate that social media has become a major news and information source in Bangladesh. The urban slums of Delhi, India, were the site of the investigation. Furthermore, research by **Kohli et al. (2019)** shows that television serves as DF's

primary information source. Additionally, according to a study by **Pai et al. (2020)**, the media (including radio, television, and newspapers) was the most popular source of information about dengue knowledge. This illustrates how government-sponsored public education initiatives affect the populace as a whole. Public awareness has been greatly aided by the media, especially television. This was comparable to the findings of the Kuala Lumpur study (**Shuaib et al., 2019**).

Pregnant women's knowledge means scores about dengue fever preventive measures both before and after the implementation of an educational program improved significantly, according to the study's findings. It demonstrated the advantages of implementing educational programs into practice, according to the researchers. As a result of the educational program, four out of five pregnant women had a satisfactory level of knowledge regarding dengue fever preventive measures, compared to fewer than one-fifth of them before the program's implementation, according to the study's findings. The relevance of providing educational programs for pregnant women to enhance their understanding was highlighted, in the opinion of the researchers.

The survey revealed poor levels of knowledge of the prevalence of dengue fever, despite moderate knowledge about dengue illness. This finding can indicate a lack of knowledge and exposure to dengue disease (**Chido-Amajuoyi et al., 2021**). According to **Rahman et al. (2022)**, insufficient ways to limit mosquito reproduction have demonstrated a knowledge gap, and numerous participants in our previous web-based research study involving college students and the general public were not aware of the contagious behavior of the dengue virus. The present study's findings on this subject, "Slum Residents Lack Basic Awareness of Dengue Disease," were published in 2017. The study was done by Chatchen et al. Dengue was unknown to the majority of people. Additionally, **Selvarajoo et al.'s (2020)** finding that only a small proportion of participants correctly predicted their chance of contracting dengue during pregnancy is similar to our result. Unawareness of the risks posed by

dengue during pregnancy was another finding in Malaysia. In past studies, this danger has been mentioned (Selvarajoo et al., 2020).

The current study's results showed that the pregnant women under investigation had both highly statistically significant improvements and differences in their overall practice level regarding dengue fever preventative measures before and after the implementation of an educational program. According to the researcher, it demonstrated the efficacy of the study's objectives and the need to put in place instructional programs that lead to advancements in practice. The current study's results showed statistically substantial improvements in every aspect of pregnant women's overall practices, both before and after the implementation of an educational program. According to the researcher, this proved the worth and efficacy of putting in place educational programs that lead to advancements in practice. **Nguyen et al. (2019)**, who discovered that insufficient methods to stop mosquito reproduction have revealed the knowledge gap, corroborate this outcome.

According to **Ghani's (2019)** study conducted in Malaysia, individuals from dengue fever-affected areas exhibit superior knowledge and practice following the implementation of a proactive program aimed at safeguarding the health of vulnerable groups within the community. The findings of earlier Malaysian research by **Zaki, (2019)** and **Alhoot, (2017)** demonstrated that urban residents typically have positive attitudes towards dengue prevention and good dengue prevention practices. Additionally, a few other studies (**Abas et al., 2019**) & **Mahyiddin et al., 2019**) noted effective dengue prevention activities within urban areas, as well as good knowledge, attitudes, and dengue preventative behaviors. This is in line with previous cross-sectional research conducted by **Abdul Aziz, (2019) in Malaysia**.

The knowledge and educational program of the pregnant women in the study were shown to be correlated, according to the analysis of the current study. Furthermore, there existed a marginally adverse

association among the place of residence, occupation, and practice of pregnant women. This could result in pregnant workers being more fatigued for longer periods at work. This could contribute to the explanation of why cultures, values, and beliefs differ between rural and urban places. Additionally, it could assist in explaining why pregnant women in rural areas have fewer practices because of a lack of access to medical equipment, a lack of knowledge about social media, and challenges in getting to an urban hospital or health center when they show symptoms of infection. Similarly, Another Malaysian study done by **Ghani, (2019)** has reported employment status to be associated with a good attitude toward dengue prevention.

However, according to the multivariate analysis, employment was a reliable indicator of good knowledge on its own. Research indicates that having a good understanding of dengue is significantly positively correlated with education (**Wan et al., 2016; Ghani, 2019; Wong et al., 2019**); yet, another study (**Naing et al., 2019**) suggests that job has an impact on knowledge. The reason behind this could be that those in the workforce are more likely than jobless people to participate in health campaigns and workplace education, and they also possess greater knowledge about dengue fever.

The results of this study showed that relationships existed between the pregnant women under study and their overall mean knowledge and practice scores after the implementation of the educational program. This correlation suggests that enhanced and effective practice follows from sound understanding. Inadequate behaviors and unfavorable attitudes stem from a lack of understanding, according to the study. Nevertheless, following the implementation of the educational program, this outcome demonstrates the value of the program, which satisfied the needs of the pregnant women and gave them the necessary information and experience to manage this illness.

Most of the findings are in line with those of a few previous research (**Kamel, 2017 and Nasaruddin et al., 2019**). Some research, however, has solely examined the relationship

between dengue awareness and effective dengue control measures. According to earlier research, effective breeding site removal by seek-and-destroy methods necessitates sound knowledge and technique (**Carandang et al., 2020**). Some researchers, like **Azfar (2017)**, **Lozano et al. (2018)**, and **Mahyiddin et al. (2019)**, found no connection between best practices and knowledge. This result differs from other KAP research that discovered knowledge gaps about dengue infection (**Souza et al., 2018**); yet, this discrepancy may stem from the survey participants' high levels of education. In a similar vein, research revealed that general dengue knowledge was positively correlated with higher education levels (**Diaz-Quijano et al., 2018**; **Harapan et al., 2018**; **Benítez-Díaz Harapan et al., 2020**).

The current investigation successfully supported the goal and hypothesis of the study. Prior research has indicated that enhanced education initiatives by healthcare practitioners and explicit recommendations by healthcare providers supporting vaccination uptake can enhance general information accessibility (**McBride et al., 2018**). Previous research in Malaysia on dengue KAP has also shown the value of educational programs in raising general awareness of dengue, especially among low-income or less-educated communities (**Ghani et al., 2019** **Lugova & Wallis, 2023**). According to **Aguolu et al. (2022)** and **Peters (2022)**, the application of educational interventions in healthcare settings can be successful.

Increasing public knowledge of dengue hazards and prevention techniques is one goal of certain efforts (**Ghio et al., 2021** **Visscher et al., 2018**). In terms of avoided dengue infections and lost disability-adjusted life years, combined control programs in Thailand have been demonstrated to have the greatest impact on disease burden when compared to solo interventions (**Knerer et al., 2020**).

Control measures are required because, while vector control may reduce the risk of developing dengue, vaccinations may increase the severity of the disease if it is contracted. This is because dengue infection risk is lower and population immunity is trending lower in places where vector management is successfully

implemented (**Hapuarachchi et al., 2016 and Koh et al., 2018**). Prior research has demonstrated that in limited or controlled situations, control programs can be run simultaneously to maximize effectiveness (**Hendron & Bonsall 2016**). According to results from another study, participants were more likely to take part in a program that had an educational component. Previous studies have demonstrated that increasing understanding of disease prevention and, consequently, willingness to get vaccinated can be achieved through education about population immunity, including conveying the social benefits of population immunity and creating educational materials that visually demonstrate its effects (**Lazic et al., 2021**).

### Conclusion:

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Based on the results and hypotheses of the present study, the study findings concluded that implementing educational program has a positive effect on improving pregnant women's knowledge and practice regarding preventive measures of dengue fever. **Also**, There was a significant correlation ( $p$  value $<0.001$ ) between knowledge and practice regarding preventive measures for dengue fever.

### Recommendations:

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The following suggestions are made based on the current study's findings:

- Implementing educational program on pregnant women's knowledge and practices regarding preventive measures of dengue fever is recommended in various maternity healthcare settings.

- Educational booklets should be provided about dengue fever for pregnant women.

- Replication of the current study with a larger sample of patients undergoing cardiac surgery in different settings is required for generalizing the results.

- Develop evidence-based prevention strategies and policies; collect official records of dengue and severe dengue

- Publishes guidelines and handbooks for surveillance, case management, diagnosis, dengue prevention and control

- Assists countries in improving their reporting systems and capturing the true burden of the disease; trains clinical managers, diagnoses, and control vectors at the national and regional levels with some of its collaborating centers.

- Recommendations for further research: Research how health education programs affect women's awareness, maternal, and fetal outcomes.

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