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Knowledge of dengue fever and health prevention in VMT residents – Peru

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Abstract

In addition to this, a comprehensive review, data collection, and critical analysis of the study will be carried out. Within this analysis, we will approach general and control knowledge, including preventive aspects. The method used has a quantitative research approach, utilizing basic research with a descriptive cross-sectional non-experimental design. The preventive practice variable is complex, as it will study more than two dimensions. In the research, the sample was composed of 170 inhabitants and is of a non-probabilistic type. The orientation is supported by the research for results through a questionnaire or items, obtaining an excellent reliability and maintaining adequate consistency. The Spearman correlation, where rho=0.620, shows that the null hypothesis is rejected and the general hypothesis is accepted, manifesting a high positive correlation between both variables, highlighting the importance of knowledge of dengue disease in the execution of preventive practices. In conclusion, the study indicates that the residents of the fenced area of the district of Villa Maria del Triunfo possess a basic to moderate level of health literacy, which they apply directly in preventive practices. However, this limited knowledge constitutes a barrier to the adoption of sustained health-promoting behavior. The lack of comprehensive understanding increases the population's vulnerability to potential infection. Therefore, ongoing educational initiatives and the promotion of awareness-raising strategies are essential.

Keywords: Dengue, Flavivirus, Knowledge, Prevention, Public health, Virus.

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1. Introduction

The increase in positive dengue virus cases affecting children, adolescents, and adults has prompted concern. According to the Pan American Health Organization – PAHO (March 29, 2024), it emphasizes the importance of surveillance, prevention, and inspection of the Aedes mosquito. The organization also urges authorities to rigorously implement preventive strategies and vector control measures. As of epidemiological week 12, approximately 3,578,414 dengue cases were reported, representing more than 3 times compared to the year 2023. The World Health Organization – WHO (May 10, 2024) has classified the situation as a massive outbreak for the year 2024, the most severe in the past five years, reflecting a 387% increase over previous years. By epidemiological week 16, the numbers remained alarming, with a 206% increase in cases compared to the same period in 2023. Additionally, the case fatality rate stands at 0.02%, with 2,844 reported deaths, according to PAHO (May 10, 2024).

The existing problematic reality lies in the lack of awareness about dengue fever among the residents of the district of Villa María del Triunfo (VMT), which represents a serious public health problem. Many community members may not be adequately informed about the symptoms of the disease, how it is transmitted, and what measures can be taken to prevent it. This can result in a massive increase in dengue cases in the area, with major negative consequences for public health. Moreover, limited access to healthcare services that promote dengue prevention may hinder residents from adopting effective preventive practices [1].

This situation may also be influenced by several constraints, including economic hardship, inadequate sanitation infrastructure, and the absence of targeted educational programs on dengue. Through the studies conducted, we were able to assess the population's basic level of knowledge about dengue and their preventive practices, identifying the key barriers to implementation. Based on the results of the surveys, we aim to design educational and intervention strategies that will support improved dengue prevention in the district of VMT.

It is essential to work collaboratively with local authorities, such as municipalities and regional governments, as well as health organizations and the broader community to adopt more effective measures aimed at reducing the incidence of dengue cases. Sound health education, public awareness, and access to healthcare services are fundamental to combating this disease and protecting the population from its adverse effects [2].

According to UNICEF (March 4, 2004), 13% of the cases reported by the Ministry of Health's Dengue Surveillance Platform during epidemiological week 8 had fatal outcomes, with 44 reported deaths, 6 of which were children between 0 and 11 years old. UNICEF (March 4, 2024) further notes that Peru is among the Latin American countries with the highest dengue-related mortality rates. Moreover, 3 out of every 10 reported cases involve children and adolescents in the northern coastal region. In response, UNICEF (March 4, 2024) calls on the authorities and the education sector to implement environmental prevention strategies to avoid the spread of breeding grounds for the virus, maintaining a safe environment for students [3].

According to The New York Times (April 13, 2024), the massive proliferation of the dengue mosquito is attributed to climate change and densely populated urban areas with poor infrastructure, particularly in warm and humid environments. In Latin America, for example, while approximately 4.5 million dengue cases were reported throughout all of 2023, an alarming 3.5 million cases were registered in just the first three months of 2024.

This study seeks to describe and identify the current problem in the sector of the district of Villa María del Triunfo (VMT), with the aim of determining the degree of relationship between two key variables. The research will be conducted among residents of the area, specifically on blocks 10 through 17 of Avenida Villa María. This will allow for the assessment of the problematic reality using research instruments during the declared public health emergency caused by the dengue epidemic. At present, residents in the sector are actively applying preventive strategies, driven by the surge in confirmed cases of dengue fever, commonly referred to as "breakbone fever." As a result, they are compelled to adopt vector control measures to mitigate the emergence of mosquito breeding sites.

Within the national background, Castillo and Pérez [4], in their thesis work, present the general objective of establishing a link between knowledge about dengue and the incidence of confirmed cases in the Peruvian population in 2020. The national population from the National Survey of Budgetary Programs, variables such as transmission, symptoms, preventive measures, and attitudes towards dengue were analyzed. It was observed that the departmental center with the highest flow of reported cases had greater knowledge about the form of transmission, with outstanding percentages such as TBP (92.2%), UCA (72.0%), LTO (71.9%), IC (71.9%), MD (89.3%), SM (83.5%), PIU (81.4%), and LA (80.8%). The most recognized signs were hyperthermia, headache, and spasms, with hyperthermia being the most recognized in all the groups studied. Although Madre de Dios had outstanding knowledge about symptoms and preventive measures, fewer people were willing to go to a health center. It was concluded that it is crucial to strengthen preventive measures and improve knowledge about dengue in vulnerable areas, suggesting also evaluating risk perception for a positive impact in these areas [5].

On the other hand, Sotelo [6] aimed to assess the level of knowledge about dengue and preventive measures among the local population, with the purpose of raising awareness about the importance of being informed and adopting appropriate practices. The target population consisted of 994 residents, from which a random sample of 168 individuals was selected. A descriptive, quantitative, cross-sectional methodology was used, employing surveys to measure the first variable and observation with a corresponding guide for the second. The results indicated that 64.9% of the population had insufficient knowledge about dengue, while 35.1% demonstrated adequate understanding. In terms of preventive practices, 54.8% engaged in inadequate behaviors, whereas 45.2% followed appropriate practices. In conclusion, although vector control measures were found to be adequate, personal and environmental protection practices were insufficient in the district of San Clemente, Pisco, during the study period.

Furthermore, Narcizo [7] conducted a study aimed at diagnosing the level of awareness regarding dengue prevention among merchants in Bagua Grande. Using a descriptive, cross-sectional design, 108 merchants were surveyed. The results showed that 48.2% of respondents were women and 51.2% were men. Regarding marital status, 45.5% were single and 48.1% cohabited. In terms of educational level, 42.6% had secondary education and 32.4% had higher education. As for knowledge of preventive measures, 73.2% showed a good level, 25.9% moderate, and 0.9% poor. Regarding vector identification, 48.1% had good knowledge, 41.7% moderate, and 10.2% poor. In terms of personal and household prevention, 55.51% demonstrated good practices, 42.6% moderate, and 1.89% poor. In relation to reservoir management and safe water storage, 57.4% had good practices, 36.1% moderate, and 5.5% poor.

At the international level, according to Tang et al. [8], dengue is one of the most significant diseases affecting the well-being of populations at risk. It is caused by viruses belonging to the Flaviviridae family and exists in four related but antigenically distinct serotypes, identified as DENV-1, DENV-2, DENV-3, and DENV-4; numerous studies, including those by Mata et al. [9] indicate that the dengue virus has an average incubation period of 5 to 8 days and often presents asymptomatically. In symptomatic cases, which account for approximately 20%, clinical manifestations may vary, ranging from mild to severe, with some cases resulting in death.

It is important to highlight that the Pan American Health Organization (PAHO) [10], along with other institutions, has emphasized the urgent need for dengue prevention. This has prompted a call for citizens to recognize the seriousness of the situation by eliminating potential mosquito breeding sites to help prevent the spread of the disease. Additionally, public health facilities have been urged to take timely precautions, conduct early diagnoses, and educate the public about this illness. It is also essential that dengue symptoms often overlap with those of other illnesses, leading to diagnostic confusion. For this reason, Dash et al. [11] suggest the use of ELISA testing as an alternative to rule out false positives. It should be noted that in many countries where dengue is abundant, there are also cases of COVID-19, and this test is not a first option due to the economy of these countries. There is the option of the rapid test to rule out infection, but it is also not 100% certain because of the cases of COVID and its alleged dubious interpretations. It is also important to mention that this endemic disease is very dangerous for all people living in the world and according to Escobar [12] and Aparicio [13], dengue remains a challenge for the well-being of all citizens prone to suffer from it. Health care providers must play a leading role in the prevention and elimination of this disease, putting effort into training campaigns, elimination and surveillance of possible breeding sites in all affected areas with a history full of this disease, to prevent possible deaths of the most vulnerable citizens.

The main objective of this research is to determine the relationship between the level of knowledge about dengue and the understanding of the widespread proliferation of the dengue mosquito (Aedes aegypti) breeding sites among residents of the Villa Maria del Triunfo (VMT) district. The study seeks to identify and highlight effective preventive practices against dengue within the district.

Regarding the purpose of the investigation, the question of what it is worth asking: to understand the relationship between the two variables proposed during the approach to the research topic, considering the knowledge about dengue is fundamental and essential for the due increase in cases in the given population, and likewise, the preventive practices to prevent mosquito breeding sites in the district of VMT. Furthermore, the study aims to identify the relationship between the degree of knowledge of dengue and the influence of preventive practices against mosquito breeding sites, allowing for a more detailed understanding of the positive and/or negative aspects of the relationship between the two variables. Similarly, this research aims to contribute to the existing body of knowledge regarding the level of awareness about dengue and the associated preventive practices, providing meaningful information that may positively influence the environmental health sector of the district.

2. Theoretical Framework

The development of the theoretical framework will involve a comprehensive analysis of various literacy sources, including books, specialized journals, and academic articles. This analysis aims to conceptualize the research by providing a clear and detailed understanding of the state of the art within the field of study. Through the review and synthesis of existing literature, the theoretical and contextual foundations that support this research will be established, highlighting recent advancements, prevailing trends, and ongoing debates.

First, the World Health Organization (WHO) (April 23, 2024) and Ramírez [14] indicate that dengue fever is a viral infection primarily transmitted through two mechanisms. The first involves direct transmission to humans via infected female mosquitoes, most commonly Aedes aegypti. The second form is through people infected with mosquitoes, which means that the host in most cases presents with non-serious symptoms such as high fever, headache, emesis, and rash. In other cases, WHO (April 23, 2024) points out that if the patient presents with the severe dengue serotype, it can become fatal, as the organism shows shock that causes hemorrhages and failure in the circulatory system. Likewise, as pointed out by WHO (April 23, 2024), DENV inhabits tropical and subtropical climate zones, and breeding occurs in environments with unprotected accumulated water.

According to WHO (April 23, 2024) and Ramírez [14], the first worldwide outbreak of this flavivirus family dates to approximately 1950 and 1975, occurring in the ASEAN area, being the main reason for the death of minors. However, dengue virus DENV has become more relevant in the last century, having a strong presence since the 2000s, as stated by WHO (April 23, 2024) approximately 505,430 cases were documented, and this number has significantly increased in 2024 with 7,327,521 cases registered by epidemiological week 17, according to figures from the PAHO (May 16, 2024).

The World Health Organization (WHO) [15] and Ramírez [14] attribute the expansive spread of arboviruses to events following the Second World War, during which military troops moved across various global regions, inadvertently spreading the disease. In the 21st century, the contributing factors have diversified, with climate change and the El Niño phenomenon

playing a significant role. As noted by the World Health Organization (WHO) [15] and Alvarado [16], rising temperatures have expanded the geographic reach of the virus, which thrives in tropical and subtropical environments. Additionally, Alvarado [16] emphasizes the influence of human migration, the lack of preventive health programs, the deterioration of healthcare systems following the COVID-19 pandemic, as highlighted by the World Health Organization (WHO) [15] as well as housing conditions and demographic factors that all contribute to the proliferation of dengue serotypes.

Pan American Health Organization (PAHO) [10] and Alvarado [16] further indicate that the endemic nature of the virus is associated with macro-determinants such as altitude and latitude (particularly elevations above 2,000 meters above sea level), ambient temperatures ranging from 15°C to 40°C, and high humidity levels. Unplanned population density and irregular water supply systems also play crucial roles, especially when water storage containers remain uncovered or unprotected for periods exceeding seven days. Regarding micro-determinants, Alvarado [16] specifically mentions host-related factors, which encompass individual-level characteristics. Another important factor identified by Alvarado [16] is the current condition of the vectors, including mosquito density, proliferation, abundance, and biting frequency, particularly in relation to female mosquitoes. A fundamental element influencing virus transmission is the local water supply system, as the presence of uncovered or poorly managed water sources often leads to the formation of breeding sites for flaviviruses, further exacerbated by the improper disposal of solid waste in open-air environments.

Driggs [17] and the World Health Organization (WHO) [18] stated that DENV infection encompasses a broad clinical spectrum, ranging from asymptomatic cases to severe, life-threatening manifestations. The most critical presentations are associated with hemorrhagic shock, compromising both the circulatory and immune systems. According to Driggs [17] and the World Health Organization (WHO) [18], the progression of the disease follows three distinct phases. Firstly, the febrile period, during which the virus is present in the blood, its evolution towards cure lies in the fall of fever. The patient will transiently experience sweating, exhaustion, and fatigue. In a smaller percentage of cases, this is associated with aggravation leading to the second phase of the process. Secondly, in the critical stage, plasma extravasation is evident, digestive hemorrhages occur, in addition to organ damage. Platelet levels decrease, and hematocrit rises, damaging the platelets and causing a decrease because the immune system produces antibodies, but this brings with it an abrupt decrease in thrombocytes, as mentioned in Infobae (March 22, 2024). In third place, reports Driggs [17] indicate the recovery phase, where a higher percentage shows improvement in the person's state of health, but in a lower proportion, a state of fluid overload or bacterial infection is evidenced.

In relation to the operational classification of dengue, Driggs [17] states that it is divided into three main groups. DENV without warning signs corresponds to groups 0 and 1. Group 0 includes individuals who do not present with febrile symptoms or clinical manifestations, yet there remains a probability of viral infection. In such cases, specialists evaluate the epidemiological nexus to classify it, group 1 belongs to those who are suspected cases of the disease, since they have a complex symptomatology of headaches, exanthema, leukopenia and digestive problems, in relation to the second group Driggs [17] mention with alarm signs, group 2 and 3 are included, being group 2 related to suspected cases of DENV with skin bleeding, the disease manifests itself, with an evaluation of platelets and hematocrit, to later follow up if alarm signs are evidenced, moving on the next grouping point, DENV with alarm signs, belonging to group 3, in this group there is evidence of intense abdominal pain, frequent vomiting, hepatomegaly, mucosal bleeding, and an alarming elevation of hematocrit. And finally, Driggs [17] mentions group 4, where severe dengue or DENV shock is manifested, in this situation the host presents a thread-like pulse, as well as cerebral hypoxia due to hypoperfusion, the patient may be disoriented and have mental confusion, if the state of health is not controlled the WHO (April 23, 2024) indicates that it can be become fatal.

According to Khan [19]; Simmons [20] and Pontes [21] dengue is a widely recognized disease with a global presence, particularly in countries with tropical climates, where such environmental conditions favor viral incubation, individuals living in these regions are more likely to contract the disease, as supported by research conducted by Escobar [12] and Aparicio [13].

As noted by Mata et al. [9], once a person is infected by a mosquito carrying the virus, symptoms may range from mild or asymptomatic presentations to severe illness accompanied by serious complications, which often require immediate medical attention. Early diagnosis can help manage and mitigate the impact of the disease.

In agreement with Pan American Health Organization (PAHO) [10] ELISA tests are recommended for confirming or ruling out dengue infection, as they are considered more reliable compared to rapid tests, which despite of being commonly used for early detection, do not offer complete diagnostic accuracy; nonetheless, rapid tests remain a useful tool for preliminary screening following a mosquito bite from a potentially infected vector, as noted by the Peruvian Ministry of Health [22].

Likewise, the second variable, preventive measures, plays a crucial role in mitigating the spread of the disease, being health authorities responsible for promoting and implementing protective strategies aimed at preventing the proliferation of the dengue-carrying mosquito; in many services, such as direct water supply from official providers, facilitates the breeding of mosquitoes, as highlighted by Vidal [23].

In the first dimension, according to Tang et al. [8], the Flaviviridae family is the primary agent responsible for the transmission of this virus through the bites of infected mosquitoes, and there are four related serotypes identified as: DENV1, DENV2, DENV3, and DENV4. The transmission of the virus is primarily linked to bites from virus-carrying mosquitoes. It is important to note that mosquitoes not originally infected can become carriers after biting individuals already infected with the virus, thereby accelerating the rapid spread of dengue. Studies conducted by Mata et al. [9] indicate sites where the mosquito's incubation period is approximately eight days, and common breeding sites include stagnant water containers, flower vases, and animal water dishes, among others.

The second dimension, according to the Pan American Health Organization (PAHO) [10] and other involved organizations, reveals that many citizens have limited or no knowledge of the severity of this disease, there is also a widespread lack of awareness regarding the prevention and elimination of mosquito breeding grounds, particularly stagnant water, providing the ideal environment for the incubation over an average period of 5 to 8 days, as reported by Mata, et al. [9]. The lack of public health education and delayed response from healthcare centers are significant barriers to addressing this public health emergency; nevertheless, it is believed that coordinated efforts between health institutions and community members could significantly improve early diagnosis and raise awareness among those most vulnerable to the disease.

In the third dimension, according to the World Health Organization [24] dengue virus infections resulting from mosquito bites have significantly increased in recent years, numerous countries that were not previously considered hotspots for dengue transmission are now experiencing the consequences of the disease; projections suggest that, in the coming years, dengue cases could reach over 400 million infections, with an estimated 100 million individuals at risk of developing severe complications due to the virus and its dangerous symptoms. According to Dengue [25], approximately 1,000 confirmed deaths have been reported in the Americas.

The fourth dimension, as noted by the Pan American Health Organization (PAHO) [10] and the World Health Organization [24] emphasizes the importance of combating the virus using ELISA tests, which Dash et al. [11] describe as reliable for ruling out false positives; public education campaigns on dengue have also been implemented to raise awareness, promoting the elimination of breeding sites, and encouraging proper adherence to water conversation practices.

The fifth dimension, based on Pan American Health Organization (PAHO) [10] recommendations, highlights that health protection against mosquito bites and consequently, the risk of infection, is a shared responsibility at the community and household levels. According to Matta [26], it is essential to engage families in preventive actions within their homes. The Peruvian Ministry of Health [22] recommends avoiding stagnant water from rainfall, discarding unnecessary pet water containers after use, and carefully managing stored water intended for daily use and personal consumption.

3. Method

This study is classified as basic research, depending on its results and findings, new products and scientific advances may appear [27]. The approach used was quantitative, which, according to Hernández et al. [28], and cross-sectional, based on numerical statistics, to establish patterns of behavior and theoretical analysis. It employed a non-experimental, cross-sectional correlational design. Caballero [29] and Arias [30] emphasize that this type of research is dedicated to the description of characteristics or phenomena at a specific time, without intervention or manipulation of the variables studied. In this approach, data are collected simultaneously from all relevant variables, allowing the observation of how they relate to each other at a point in time. Correlational analysis seeks to identify whether there is any statistical relationship between two or more variables, although this method does not allow causal relationships to be established.

The population refers to the complete set of individual elements or data that share common characteristics, which enables research using surveys [31]. This population may be finite or infinite depending on whether the number of elements is limited or unlimited. In this study, the total population consisted of 300 residents, with a sample of 170 individuals, applying a 5% margin of error and a 95% confidence level. The inclusion criteria were individuals residing in the designated area of the Villa María del Triunfo district in 2024, individuals aged 18 or older, and those willing and available to participate in the study. To assess the variable Level of Knowledge about Dengue, a questionnaire developed by Torres Sebastián, Julio César was used. The reliability of this instrument was measured using Cronbach's alpha, yielding a coefficient of 0.92. Additionally, to assess the variable Preventive Practices, a questionnaire adapted from a thesis by Arias was implemented, which obtained Cronbach's alpha of 0.82, indicating high reliability. The validity of both instruments was determined through expert judgment.

Table 1.
Table of normality test of the variables.

Normality Tests						
	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**gl**	**Sig.**	**Statistic**	**gl**	**Sig.**
Knowledge about Dengue	0.222	170	0.000	0.800	170	0.000
Preventive Practices	0.235	170	0.000	0.795	170	0.000
Note: a. Lilliefors significance correction applied						

4. Results

The results of the Kolmogorov-Smirnov and Shapiro-Wilk normality tests indicate that the data for both variables do not follow a normal distribution, with a significance value of 0.000 in both tests. The Kolmogorov-Smirnov test, with Lilliefors significance correction, and the Shapiro-Wilk test confirm that the deviations from normality are statistically significant. Since the data do not meet the assumption of normality, non-parametric statistical methods will be applied for the analysis, such as Spearman's rank correlation instead of Pearson's correlation to ensure the validity of the study's results.

Table 2.
Correlations between Knowledge about Dengue and Preventive Measures Practices variables.

			Preventive Measures Practices
		Correlation Coefficient	0.620**
Spearman's rho	Dengue knowledge	Sig. (2-tailed)	0.000
		N	170

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The table presents a significant relationship between knowledge about dengue and preventive practices using Spearman's rank correlation coefficient. The analysis shows a correlation of 0.620, indicating a moderately strong positive association between the two variables. The statistical significance is high ($p<0.01$). With a sample size of 170 cases, the results highlight the importance of educational and awareness campaigns, as increased knowledge about dengue is associated with greater adoption of preventive practices.

Table 3.
Frequencies for the Knowledge about Dengue variable.

	Frequency	Percentage	Cumulative percentage
Unknown level	57	33.5	33.5
Basic level	63	37.1	70.6
Advanced level	50	29.4	100.0
Total	170	100.0	

The frequency table on knowledge of dengue reveals that 33.5% of respondents are at the "Unknown level", 37.1% at the "Basic level", and 29.4% at the "Advanced level", for a total of 170 people. This indicates a relatively even distribution of knowledge, with a slight majority possessing a basic understanding of dengue, while a considerable proportion still do not know important aspects of the disease, and a smaller proportion possesses proficient knowledge. These results underscore the need for educational interventions to improve the quality of life concerning these diseases, thus promoting better preventive practices and reducing the incidence of the disease.

Table 4.
Frequencies for the Preventive Measures Practices variable.

Preventive Measures Practices			
	Frequency	**Percentage**	**Cumulative percentage**
Unknown level	61	35.9	35.9
Basic level	59	34.7	70.6
Advanced level	50	29.4	100.0
Total	170	100.0	

The table shows the distribution of dengue knowledge levels. Among the 170 respondents, 35.9% are unaware of the preventive measures, 34.7% have a basic level, and 29.4% have an advanced level of preventive measures. The results suggest that, as with general knowledge about dengue, there is a relatively even distribution among the levels of knowledge of preventive measures, with a slight majority not knowing or having only a basic understanding.

Table 5.
Correlations of the General Knowledge and Control Knowledge Dimensions with the Preventive Practices Variable.

Correlation between the variable Practices of preventive measures and the dimensions General Knowledge and Control Knowledge					
			Preventive measures practices	**General knowledge**	**Control knowledge**
	Preventive measures practices	Correlation Coefficient	1.000	0.507**	0.634**
		Sig. (2-tailed)		0.000	0.000
		N	170	170	170
	General knowledge	Correlation Coefficient	0.507**	1.000	0.629**
Spearman's Rho		Sig. (2-tailed)	0.000		0.000
		N	170	170	170
	Control knowledge	Correlation Coefficient	0.634**	0.629**	1.000
		Sig. (2-tailed)	0.000	0.000	
		N	170	170	170

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The analysis of correlations between the dimensions of General Knowledge and Control Knowledge with Preventive Practices reveals that positive and statistically significant relationships exist across all dimensions. Specifically, General Knowledge demonstrates a moderate correlation with Preventive Practices (0.507), suggesting that a broader understanding of dengue is associated with more consistent adoption of preventive behaviors. In contrast, Control Knowledge demonstrates a stronger correlation with Preventive Practices (0.588), emphasizing the critical role of deep knowledge about vector control and mitigation strategies in promoting effective disease prevention. Furthermore, a moderate to strong correlation was found between General Knowledge and Control Knowledge (0.558), indicating that individuals with a solid foundational understanding of dengue are more likely to comprehend and apply targeted control measures. These findings indicate the importance of designing integrated educational interventions that address both general and specific aspects of dengue prevention, focusing on actionable control strategies and fostering the practical application of acquired knowledge among at-risk populations to reduce disease incidence effectively.

Table 6.
Cross-tabulation on Prevention and General Knowledge.

			General Knowledge			**Total**
			Unknown level	**Basic Level**	**Advanced level**	
Prevention Measures Practices	Unknown level	Count	32	27	2	61
		Expected count	18.3	27.6	15.1	61.0
		% within General Knowledge	62.7%	35.1%	4.8%	35.9%
	Basic Level	Count	15	30	14	59
		Expected count	17.7	26.7	14.6	59.0
		% within General Knowledge	29.4%	39.0%	33.3%	34.7%
	Advanced level	Count	4	20	26	50
		Expected count	15.0	22.6	12.4	50.0
		% within General Knowledge	7.8%	26.0%	61.9%	29.4%
Total		Count	51	77	42	170
		Expected count	51.0	77.0	42.0	170.0
		% within General Knowledge	100.0%	100.0%	100.0%	100.0%

The table represents a cross-comparison between levels of general knowledge about dengue and levels of knowledge about prevention measures. For example, of the 61 people who do not know about prevention measures, 62.7% also ignore dengue in general. On the other hand, among the 50 people who have an advanced level of prevention measures, 61.9% also demonstrate the same level of general knowledge about dengue. These data show a trend in which people with greater general knowledge about dengue also tend to have greater knowledge about prevention measures.

Table 7.
Cross-tabulation on Prevention and Control Knowledge.

			Control Knowledge			Total
			Unknown level	Basic Level	Advanced level	
Preventive Measures Practices	Unknown level	Count	39	20	2	61
		Expected count	20.1	23.0	17.9	61.0
		% within Control Knowledge	69.6%	31.3%	4.0%	35.9%
	Basic Level	Count	15	30	14	59
		Expected count	19.4	22.2	17.4	59.0
		% within Control Knowledge	26.8%	46.9%	28.0%	34.7%
	Advanced level	Count	2	14	34	50
		Expected count	16.5	18.8	14.7	50.0
		% within Control Knowledge	3.6%	21.9%	68.0%	29.4%
Total		Count	56	64	50	170
		Expected count	56.0	64.0	50.0	170.0
		% within Control Knowledge	100.0%	100.0%	100.0%	100.0%

The cross-tabulation analysis shows a positive relationship between preventive measures and knowledge of control. It is observed that 69.6% of those who are unaware of preventive practices are also unaware of control, while only 4% achieve advanced levels. In contrast, 68% of those who master preventive practices also master control knowledge, showing a significant connection. Furthermore, the values observed exceed the expected ones in some categories, indicating that the relationship is stronger than expected. These findings suggest that improving preventive practices may increase control knowledge. It is concerning that a large part of the population with a low level of preventive measures also has little knowledge of control, which emphasizes the need for specific training to strengthen both competencies and reduce risks in critical environments.

The data presented in the tables suggest that there is a close relationship between general knowledge about dengue, specific knowledge about its control, and knowledge about prevention measures. Significant correlations indicate that increasing knowledge in one of these areas is likely to improve knowledge in others. Therefore, education and awareness efforts should focus on providing comprehensive information covering all these aspects to maximize the effectiveness of dengue campaigns.

5. Discussion

A total of 33.5% of respondents demonstrated no understanding of dengue, while 37.1% exhibited a basic level of understanding, and 29.4% showed an advanced level of knowledge regarding the virus. This inequality suggests that most of the surveyed population (66.5%) is knowledgeable about dengue disease, equivalent to 66.5% of the total respondents.

Similarly, Torres [32] reported that in his study, 72.51% of respondents demonstrated a regular level of general knowledge about dengue, while only 3.96% exhibited an unfavorable level of knowledge. These findings contrast with those of Arias [33], who noted that 50% of respondents had a regular level of knowledge, whereas 20% had no knowledge at all. Furthermore, the results diverge from the study conducted by Enmanuelle [34], which indicated that 60.2% of the surveyed population had a low level of knowledge, and only 12.8% demonstrated a regular level.

As Arias [33] indicates, the work of health promotion becomes a challenge in the communities, despite working with health entities and the population, with the objective of improving knowledge about this flavivirus.

In relation to Table 4, it is shown that 35.9% have a level that does not know the prevention measures, 34.7% have a level of basic understanding, and 29.4% have an advanced level on prevention practices, being that most of the understanding and practices the prevention measures against mosquito breeding sites.

In comparison with Arias [33], his research indicates that 60% of the respondents have an inadequate level, while 40% have an adequate level of preventive practices against mosquito breeding. Likewise, Torres [32] in his research points out that 72.9% have a medium level, and only 27.09% have a high level of preventive practices against dengue.

Table 5 shows that there is a significant correlation of 0.507, which demonstrates that there is a high correlation with the prevention variable, since the higher the level of knowledge about dengue, the higher the level of preventive measures taken in the community. In Aria's research Arias [33], he states that it is important to possess adequate knowledge, as it serves as a critical tool in managing prevention strategies and implementing preventive practices to avoid the development of the disease.

In addition, it is essential to consider the opinion of other studies that highlight the importance of health education. For example, according to Gómez [35], "health education is crucial in the prevention of infectious diseases, as it provides the community with the necessary tools to adopt healthy behaviors" (p. 45). Likewise, López [36] states that "educational campaigns must be continuous and adapted to the specific needs of each community to be effective" (p. 112).

6. Conclusions

Analyzing the general objective to determine the direct and significant relationship between the level of knowledge about dengue and preventive practices in the Cercado district of VMT, developing this study in the jurisdiction of the Centro Materno Infantil Villa María located in VMT, a moderate level of knowledge about dengue was observed among the residents; therefore, it is highly recommended that the citizens be informed about this danger so that the level of knowledge is high and thus be able to prevent this imminent disease.

In the analysis of the first specific objective, which seeks to determine the level of knowledge of the inhabitants of the Cercado district of Villa Maria del Triunfo about dengue prevention practices in 2024, it is proposed that environmental health managers implement strategies to deepen training and spread information on preventive measures. It is essential that these managers develop educational programs that not only inform but also promote greater awareness among citizens about the importance of dengue prevention. In addition, the active participation of the population should be promoted, encouraging them to adopt a proactive and collaborative attitude in preventive practices. Effective awareness-raising among citizens is crucial for the success of prevention initiatives, as the joint effort between environmental health managers and the community is essential to reduce the incidence of the disease in the district.

In the analysis of the second specific objective, which seeks to determine the level of knowledge of preventive practices on dengue among the inhabitants of the Villa Maria del Triunfo (VMT) district in 2024, it is recommended that both citizens and district representatives actively play their roles in this important task. It is suggested that district representatives strengthen their efforts in imparting prevention knowledge through community agents, who should conduct effective educational campaigns. In turn, citizens of the VMT district should assume a responsible and proactive attitude in the implementation of preventive practices. Collaboration among these actors is essential to improve knowledge about dengue and promote effective preventive practices, with the aim of reducing the incidence of disease in the community.

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