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Perceived Susceptibility of Dengue Fever in District Swat

Abstract

The main aim of this paper is to find out "perceived susceptibility of dengue fever in district Swat" Pakistan. A sample size of 354 respondents was randomly selected through proportional allocation method from Tahir Abad, Banr, Engaro Dehri and Usman Abad of Swat. The association of independent variable (perceived susceptibility of dengue) and dependent variable (practices for control) were tested by using Chi Square test. The perceived susceptibility regarding dengue fever shows that association of practices for control was found highly significant with living area (p=0.004). Likewise, practices to control dengue was significantly associated with high population density (p=0.001). In addition, practices to control dengue and tires dumped on roofs was significantly associated (p=0.016) i.e. water accumulated inside used tire placed on the roofs is one of the hidden breeding place for dengue mosquito. It is concluded that those families living in overpopulated and congested communities were more vulnerable to dengue epidemic. The study recommended regular check of congested and overpopulated area for dengue vectors and its breeding places, moreover, strict rules needs to be devised and implemented to avoid improper dumping of tires and garbage materials that promote breeding of dengue mosquito and subsequently the spread of dengue fever.

Key words: *Dengue fever, residential area, Population density, sanitation.*

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INTRODUCTION

Dengue fever is a break bone fever, which appears with symptoms of headaches, high temperature, muscular/bone pains and decrease of platelets (Gubler, 2010). Dengue fever is a viral disease which has four stereotypes (DENV-1 to DENV-4) and is transmitted through the female mosquito known as Aedesaegypti. The serious circumstances of dengue fever are Dengue hemorrhagic fever and Dengue Shock Syndrome (Guzman, 2002). The Dengue hemorrhagic fever has symptoms of high temperature, bleeding, low platelet counts and plasma leakage due to low concentration of proteins and albumins in blood (Pan American Health Organization, 1994). Dengue shock syndrome occurs after 2-7 days of dengue hemorrhagic fever along with symptoms of low blood pressure and pulse, belly pain and restlessness (World Health Organization, 1997). The health belief model (HBM) is the theoretical approach to dengue prevention. The basic parts of HBM are perceived severity, perceived susceptibility, cues-to-action, perceived benefits, perceived barriers and self-efficacy.

The perceived severity is concerned with how people look and understand the health consequences and outcomes of dengue fever. The perceived susceptibility is also known perceived vulnerability which is associated with risk and enhances the chances of diseases. These two principles (perceived severity and vulnerability) of HBM model collectively cover the susceptibility aspects of the health. The principle of cues-to-action is associated with anything that may improve awareness or interest to control diseases and improve health related planning. The cues-to-action could be an awareness campaign using electronic, print and social media for health education. The principle of perceived benefits refers to the beliefs of the people in the value of adhering to health related procedures to control the disease with positive outcomes. Self-efficacy refers to the confidence of people in taking action to accomplish a task in health education. The Health Belief Model (HBM) is a step by step approach to prevent dengue fever and also encourage people to clean up dengue breeding places regularly. Similarly, perceived barriers are concerned with the assessment of people about obstacles to change their behavior and perceived costs which prevent people from taking action to control disease. If the perceived benefits do not balance the perceived costs, the proposed activity will not be implemented (Strecher & Rosentock, 1997).

LITERATURE REVIEW

Historically the dengue fever was considered as “water poison” disease in 265-420 A.D. which was reproduced in water by flying insects. During the 18^{th} and 19^{th} centuries, international business increased the spreading of dengue fever throughout the world. The most recent outbreak of dengue fever was recorded in Africa, Asia and

North America in 1779. After World War II, dengue hemorrhagic fever also spread to Southeast Asia and affected the Caribbean and Latin America in 1980 (Gubler and Clark, 1995). Brazil and the western pacific countries like Malaysia, Philippines and Vietnam also faced this outbreak recently (World Health Organization, 1999). The dengue hemorrhagic fever emerged for the first time in Manila in1953 and became generalized in Southeast Asia in 1970, spreading to India, Pakistan and Sri Lanka in 1980 (Gubler, 1997). The first dengue epidemic occurred in Pakistan in 1994 and lasted two years in Karachi. (Paul *et al*, 1998; and Wasay*et al*, 2008). Afterwards, the epidemic occurred regularly during the months of August to December (Tahir *et al*, 2010). The congested houses and standing water also provided a suitable environment for dengue proliferation (Feltrim*et.al*, 2011).In most urban areas, the control over dengue virus is not practiced properly due to poor public health facilities and water management (Gubler, 2002).

The study conducted in Thailand showed that those villages were more prone to dengue fever which were in the neighborhood of urban areas (Tipayamong kholgul & Sunisa, 2011).The study identified some sociological factors that drastically increased dengue outbreak. These factors included, patterns of houses, cleaning and examining water containers, sanitation and drainage systems, flower pots and uncovered water containers as breeding places for dengue larva. Large family size and dense population also increased the vulnerability of dengue fever. According to the study, six variables drastically increased dengue outbreak. These variables included housing density, ignoring checkup of water containers, discarding broken items, vase at home/garden, ignoring protective methods against mosquitoes/information and water storage at homes (Bhandar*et al.* 2008). Lack of proactive role from government in dengue awareness and prevention and poor co-operation from communities to search dengue breeding places promoted dengue spread. The study also determined that the cargo services, poor management of swimming pools, discarded broken items, garbage, and internal displacement of people increased vulnerability to dengue fever. Moreover, hot and rainy climate was one of the main factors which amplified the dengue fever. However, it was suggested that government should install early warning system to monitor temperature properly to prevent the spread of dengue fever. (Feltrim*et al,* 2011).

Hypotheses

1. Poor sanitation in living areas is associated with failure of dengue control practices.
2. High population and congested houses are associated with failure of dengue control practices.

3. Discarded and broken items, garbage and tires dumped on roofs are associated with failure of dengue control practices.

METHODOLOGY

This study was conducted in Swat valley of Khyber Pakhtunkhwa, Pakistan. Persons affected by dengue fever in these streets of. Tahir Abad, Banr, Engaro Dehri and Usman Abad were the potential respondents for this study. The researcher conducted a pilot survey to determine the number of dengue cases, which turned out to be 4440; according to the Sekaran table (2003), 354 patients was selected for study.

The conceptual framework is Table-1 and data was collected from respondents through interview schedule and face to face interview. The Chi Square was used to measure the relationship between dependent (practices for control) and independent (perceived susceptibility of dengue) variables. The mathematical form of Chi Square test (Taj, 1978) is given below

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{ij} - e_{ij})^2}{e_{ij}}$$

Table 1 *Conceptual framework*

Independent variable	Dependent variable
perceived susceptibility of dengue	Practices for control

For conducting Chi-Square Test the following conditions are supposed to be fulfilled;

1. Select respondents randomly and independently.
2. Selection of respondents without replacement.
3. Sample size must be fairly large; at least 10 and no expected frequency is less than five in cells of contingency table.

The Fisher Exact Test was used in the case of simple Chi-Square test when the last condition has been violated. The Fisher Exact Test numerically can be expressed as,

$$\text{Fisher Exact Test} = \frac{(a+b)!\,(c+d)!\;(a+c)!\;(b+d)!}{N!\,a!\,b!\,c!\,d!}$$

Where a, b, c, d and “n” represent the observed numbers in four cells of contingency table and the total number of observations respectively.

RESULT& ANALYSIS

Frequency and Percentage Distributions regarding perceived susceptibility of dengue

Various perceptions of respondents about dengue susceptibility are given in Table-2. The results show that the families of 50.3% respondents were more susceptible to dengue fever than others. It is evident that a big chunk of families had not checked the mosquito breeding sites and other discarded and broken items in their environment; therefore, most families were prone to dengue infection. Similarly, high proportions of respondents (77.4%) stated that their environment was more prone to dengue outbreak than others. The residential areas of most of them were congested, overpopulated and were not active in organizing at Mohallah level for eradication of dengue vectors. These findings were supported by Woodward et al (1998) who also pointed out five major causes of dengue susceptibility in the Asia Pacific region namely population density, political inflexibility, poverty, dependency and loneliness. The entire sample population or 100% were frightened of dengue fever because of lack of available vaccines and the fatal nature of the disease.

61.3% respondents, in the study,stated that poverty made them more susceptible to dengue fever. The government hospitals were not provided with proper laboratory investigation and isolation wards for dengue patients and the masses had to visit private health units for medical tests and other diagnosis for dengue fever on their own. Poverty, therefore, increased the vulnerability of the poor as they had to borrow money for treatment and in some cases remained unattended. 57.1% of the respondents stated that the density of population in their area increased dengue threat. This result was supported by Ahmad (2011) who found that susceptible factors for dengue epidemic were urbanization, overpopulation and poor management of water containers. A majority of respondents (92.7%) identified that poor health and unhygienic conditions increased dengue susceptibility. The people, therefore, that had malnutrition, lack of health facilities and large quantity of garbage in their surrounding environment were more prone to dengue infections. Similarly, high proportion or 78.2% respondents identified that tires dumped on roofs enhanced the occurrence of dengue epidemic. These tires stored water in the rainy season which was not checked and which provided a suitable environment for dengue vectors to breed. Feltrim*et al.* (2011) supported results that improperly dumped tires brought through cargo services, discarded broken items, garbage, movement of people and climatic factors increased vulnerability for dengue outbreak.

Table 2 *Frequencies and percentage distribution of respondents regarding perception of Dengue susceptibility (N=354)*

Statements	Yes	No	Don't know
Your family is more susceptible to dengue than other.	178(50.3)	176(49.7)	00
Your living area is more prone to dengue spread than other.	274(77.4)	80(22.6)	00
The rumors about dengue spread frighten you.	354(100)	00	00
Poverty in your area makes it more susceptible to dengue.	217(61.3)	131(37.0)	6(1.7)
High population density in your area increase dengue threat.	202(57.1)	47(13.3)	105(29.7)
Poor health and unhygienic condition increase susceptibility to dengue.	328(92.7)	4(1.1)	22(6.2)
Tires dumped on roofs enhance the occurrence of dengue.	277(78.2)	74(20.9)	3(.8)

* Data in table show frequencies & parenthesis show the percentages.

Association between perceived susceptibility and practices for control

Different factors are involved in dengue mosquito breeding in addition to biological and geographical factors like urban and semi urban areas of tropical and subtropical regions. There are some sociological factors like population growth, housing pattern and tires dumped on roofs etc. which increase dengue susceptibility. To ascertain the association between perceived susceptibility and practices for control, Table 3 offers an explanation:

The result shows that highly significant associations were found between living areas and practices for control ($p=0.004$) and population density and practices for control ($p=0.001$). Therefore, the study stated that those susceptible to dengue infections was increased for people living in congested and high population localities which significantly affected the practices for dengue control. Moreover, the association between tires dumped on roofs and practices for control were found to be significant ($p=0.02$). It is evident from this finding that dengue mosquitoes can breed in areas where tires are dumped on roofs and hold rainy water thus making the masses more susceptible to dengue infection. These results were supported by Ahmad (2011), who determined that vulnerable factors for dengue outbreak were the displacement of people, over population, poor management of water containers and old tires. On the other hand, the result shows a non-significant (0.308) association between family susceptibility to dengue and practices for control. Moreover, the association between poverty in the area increases the susceptibility to dengue and practices for control

were found non-significant (p=0.060). Similarly, the data shows that a non-significant (0.096) association was found between poor health/unhygienic conditions and practices for control. These results are against that of Woodward et al (1998); they pointed out major causes of dengue susceptibility in the Asia Pacific region including poverty.

Table 3 *Association between perceived Susceptibility and practices for control (N= 354)*

Perceived Susceptibility	Perception	Practices for control		Total	Chi-Square (P=Value)
		Yes	No		
Your family is more susceptible to dengue than other.	**Yes**	149(42.1)	27(7.6)	176(49.7)	$\chi2$=0.427 (0.308)
	No	155(43.8)	23(6.5)	178(50.3)	
	Don't know	0(0.0)	0(0.0)	00(0.0)	
Your living area is more prone to dengue spread than other.	**Yes**	228(64.4)	46(13.0)	274(77.4)	$\chi2$=7.094 (0.004)
	No	76(21.5)	4(1.1)	80(22.6)	
	Don't know	0(0.0)	0(0.0)	0(0.0)	
Poverty in your area makes it more susceptible to dengue.	**Yes**	179(50.6)	38(10.7)	217(61.3)	$\chi2$= 5.627 (0.060)
	No	120(33.9)	11(1.3)	131(37.0)	
	Don't know	5(1.4)	1(0.3)	6(1.7)	
High population density in your area increase dengue threat.	**Yes**	181(51.1)	21(5.9)	202(57.1)	$\chi2$=14.433 (0.001)
	No	44(12.4)	3(0.8)	47(13.3)	
	Don't know	79(22.3)	26(7.3)	105(29.7)	
Poor health and hygienic condition increase susceptibility to dengue.	**Yes**	284(80.2)	44(12.4)	328(92.7)	$\chi2$= 4.679 (0.096)
	No	2(0.6)	2(0.3)	4(1.1)	
	Don't know	18(5.1)	4(1.1)	22(6.2)	
Tires dumped on roofs enhance the occurrence of dengue.	**Yes**	236(66.7)	41(11.6)	277(78.2)	$\chi2$=8.260 (0.02)
	No	67(18.9)	7(2.0)	74(20.9)	
	Don't know	1(0.3)	2(0.6)	3(0.8)	

*percentages are given in parenthesis and in the last column the parenthesis pertain to P=Value

CONCLUSION

It is concluded that those families living in overpopulated and congested communities were more vulnerable to dengue epidemic. Similarly, poverty, high population density, unhygienic conditions like discarded broken items and tires dumped on roofs which hold rainy water also accelerate the susceptibility of dengue outbreak. It is also identified in the study that people who were more susceptible to dengue epidemic followed minimal practices for dengue control and lived in high population density,

dengue breeding regions. These people also dump tires on the roofs of their houses or other places which in turn hold rainy water, thus providing breeding grounds for mosquitoes. The study proved the hypothesis that there is no relationship between poverty and perceived susceptibility. Therefore, the hypothesis "Poor sanitation in living areas is associated with failure of dengue control practices." was rejected. Hypotheses numbers 2 and 3 were verified and proved i.e. "High population and congested houses are associated with perceived susceptibility to create hurdle to dengue fever prevention" and "Discarded broken items, garbage and tires dumped on roofs are associated with susceptibility to dengue fever to create obstacles in controlling dengue fever in district Swat". The study recommends that regular check be conducted of congested and overpopulated area for dengue vectors and its breeding places and regulating storage of tires or dumping such materials that can provide breeding place for dengue vectors.

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