

# Knowledge, attitude and practices about dengue fever among adults living in Pwani Region, Tanzania in 2019

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## Abstract

**Background:** Dengue fever (DF) is currently widespread in tropical and sub-tropical countries. Among the triggers of epidemic include urbanization and internal migrations. Within the past few years, there have been DF outbreaks in Tanzania. Although Pwani region is among the predicted risk areas for the DF, there is insufficient data about people's knowledge, attitude and practices towards prevention of DF in their settings. Therefore, the aim of this study was to assess knowledge, attitude and practices about DF among adults in Pwani region in Tanzania.

**Methods:** The cross-sectional study conducted in Mkuranga District, Pwani region in Tanzania. We used face-to-face interviews to collect data. The main analytical procedure was descriptive using frequencies.

**Results:** The majority, 97.7%, were aware of DF. Nevertheless, almost 80% had a low knowledge on symptoms, transmission and vector control measures. Furthermore, less than 20% had positive attitude towards dengue fever prevention, severity of the illness and health seeking behavior.

**Conclusion:** Lack of enough knowledge and positive attitude about disease transmission, symptoms and preventive measures put the population at high risk of contracting the disease. There is need to create and improve friendly, correct and simple information, education and education messages for the rural populations.

**Key words:** Attitude; Dengue; knowledge; practice, rural.

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## Introduction

Dengue fever (DF) is a mosquito-borne viral infection that is caused by a virus of the *Flaviviridae* family with four (DEN-1, DEN-2, DEN-3 and DEN-4) distinct serotypes. Transmission of the virus to humans occur through a bite of an infected female *Aedes aegypti* during the day time and night<sup>1,2</sup>. DF is characterized by severe illness with several symptoms including fever, at least 40°C/104°F, severe headache, nausea, vomiting, swollen glands, pain behind eyes, fatigue, severe abdominal pains and some other symptoms that mimic that of malaria symptoms<sup>3,4,5</sup>. The primary vector of DF is the *Aedes aegypti* mosquito which is more widely dispersed now than at any time in the past, pacing billions of humans at risk of infection with one or more of the four-dengue serotypes<sup>6</sup>. Patients with DF experience high medical costs and severe health deterioration, especially in psychological dimensions<sup>7</sup>. Although DF has some sim-

ilarities with malaria in terms of causing acute illness, malaria may be chronic while DF cannot. Nevertheless, there are more advanced clinical features to distinguish DF from other infections<sup>8</sup>.

The outbreak of DF is currently widespread in tropical and sub-tropical countries, primarily because of climatic changes associated with global warming and heavy rains<sup>9,10</sup>. Although Pwani region is predominantly rural, *Aedes* mosquitoes are likely to find habitat due to the swampy environment, bushes, livestock keeping and a climatic conducive for the *Aedes aegypti*; making the region among the predicted risk areas for the DF. The conducive environments for breeding sites of *Aedes aegypti* mosquitoes include some areas in urban centers turned into agriculture, flowerpots, discarded tires and sinks; jerricans, plastic drums and other containers around the residence<sup>11,12</sup>. Because of the diverse breeding habitats, the populations of *Aedes* mosquito can increase during and after heavy rainfalls; this, coupled with the habit of taking multiple blood meals from multiple human hosts serves as a risk factor for the outbreaks of DF. Within this decade, there have been several case notifications of DF in sub-Saharan African countries<sup>13</sup>.

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Although accurate data on the incidence or prevalence of DF in most of the sub-Saharan countries are either missing or inaccurate, more than 60% of the population in Africa is at risk of dengue and the disease has so far affected almost 40 countries in the region<sup>14,15</sup>. Over the years, there have been estimates of DF prevalence in some parts of Africa ranging between 8 and more than 70%<sup>16-18</sup>. Nevertheless, an in-depth meta-analysis of DF in sub-Saharan Africa estimates the prevalence of DF to be 15.6% and 24.8% among apparent healthy and febrile individuals respectively between 2000 and 2007<sup>19</sup>. In Tanzania, the prevalence of DF was between 0.5% and 50.6% in the past two decades<sup>19</sup>. In addition, there have been reports of outbreaks between 2015 and 2020 along the eastern coast of mainland Tanzania and in Zanzibar<sup>4,20-24</sup>. Although the prevalence of DF in Pwani region is not well known, there was an outbreak of DF in the Eastern belt of Tanzania that includes Pwani, Dar es Salaam and Morogoro regions in May and June 2019.

At present, unlike malaria, DF has no cure except to combat its early symptoms. In some countries, there is relatively high rate of acceptance and amount of willingness to pay for the dengue vaccine among patients with DF<sup>25</sup>. The preventive measures against *Aedes*-borne diseases like DF among individuals, communities and policy makers remain as the best course of action<sup>26</sup>. In rural areas, these measures include to prevent daytime mosquito bites in public places by fumigation as well as controlling breeding sites.

While it is very important to properly manage the symptoms, prompt and correct detection of the symptoms are among vital elements to reduce the disease severity and fatality<sup>27</sup>. In less developed nations, especially in rural settings, lack of basic education, correct understanding of DF symptoms different from other infections like malaria compounded by poor health seeking behavior mystify the patients and their care-takers. It becomes evident when there is lack of knowledge, not only among the community, but also to health care providers on other causes of acute febrile illnesses apart from malaria to warrant misconceptions and negative attitude towards DF<sup>28</sup>.

There is lack of data about the knowledge, attitude and practices towards DF among community members in Pwani Region. The present study aimed at assessing these parameters to come up with data that may be used to strategize preventive and control measures against DF.

## Materials and methods

### Study design and settings

This was a cross-sectional descriptive study conducted in July 2019. Since we aimed to study knowledge, attitude and practices on DF specifically among rural dwellers, we conducted the study in the Pwani region. We purposefully selected Pwani because it is a predominantly rural region but at high risk of DF. The region has seven districts (Kibaha, Bagamoyo, Kisarawe, Mafia, Rufiji, Kibiti and Mkuranga). We randomly selected Mkuranga District. The District (Figure 1) is located on the Eastern coast of Tanzania along the Indian Ocean. It is about 45 kilometers (28 miles) from Dar es Salaam, the country's biggest city and commercial center of Tanzania. It is predominantly rural with spots of sub-urban centres along the highway to the Southern regions and to Mozambique. The district-estimated population is about 223,000 with 46.6% in the age range between 18 and 65 years<sup>29</sup>. Administratively, the district has 25 homogeneous wards in terms of the climate and economic activities. There are two main seasons, the wet-humid and dry-hot with average day temperature ranging between 20°C/68°F and 32°C/89.6°F in the months of July/August and January/December respectively.

### Study population

The study sample included de facto resident adults aged between 18 and 65 years in the study area. In addition to the eligibility criteria, we included only individuals able to speak English or Kiswahili, a common language to almost everybody in Tanzania.

### Sample size estimation

We used a formula,  $n = Z^2p(1-p)/E^2$ , by Kish<sup>31</sup> to estimate the sample for the study. Z being the critical value of the normal distribution at 95% confidence level, p is an estimate proportion of the population with good knowledge about DF. Although the available estimate of knowledge on dengue was among healthcare workers in NorthEastern Tanzania<sup>32</sup> was about 75%, we estimated this proportion to be about 25% in the general population of Mkuranga. The margin of error, E, was set at 5%. We also adjusted for possible sampling errors villages by the design effect of 1.5 and for a 5% possibility of non-participation. These parameters yielded a minimum sample of 455.

### Sampling procedure

We selected Pwani region purposefully and randomly selected Mkuranga district. From the 18 wards of Mkuranga district, we randomly selected at least 20% of the wards that will form a representative sample of

the other wards. Selected wards were: Dondo, Kito-  
mondo, Mbezi and Mipeko. The total population in the  
four wards is about 21771 (9.8% of the District's pop-  
ulation)<sup>29</sup>. We randomly selected one village from each  
ward. We considered all households in the village to be  
eligible. Inclusion criteria were an adult (aged at least 18  
years), able to communicate in Kiswahili language and  
not too ill to participate. From a list of eligible adults  
in a household, we randomly selected and interviewed  
one adult.

### Study tools

The study team included a supervisor and an interview-  
er who was an experienced person with medical back-  
ground with some skills in interviewing techniques. We  
used an interview form organized in three sections:  
background information of the respondent, knowledge  
and attitude sections. We assessed knowledge in terms  
of symptoms, transmission and preventive methods.  
There were seven items to assess their attitudes with fo-  
cus on prevention, severity of illness and health seeking  
behaviors. We first developed the tool in English, trans-  
lated into the national language, Kiswahili, but later  
re-translated into English to make sure we maintained  
the original meaning. To assess the data collection pro-  
cedure and the quality of the questions, we pre-tested  
the tool in the households in the nearby ward that was  
not earmarked for the study.

### Data processing and analysis

We used frequencies to summarize categorical variables.  
In order to have the index of knowledge, we scored  
each correct item with 1 point. Therefore, we scored  
a question on symptoms knowledge with 14 points, 8

points on transmission; 10 points on prevention and  
<="" span="" style="font-family: "Times New Ro-  
man";>on health seeking behavior. We scaled an indi-  
vidual who scored between 0 and 11 points having a low  
knowledge, 12 to 23 points having medium knowledge  
and between 24 to 34 points as having high knowledge.  
We used a five-point Likert scale ranging between (1  
=strongly agree; 5 =strongly disagree) to assess atti-  
tudes towards DF based on six items. During data  
processing, a respondent could potentially score from  
six to 30 points. Since low scores signified a negative  
attitude and high scores a positive attitude, a cut-off  
point was to all individuals scoring above 80% of the  
scores labeled as having positive attitude<sup>33</sup>. Although we  
did not use any standard tool when measuring knowl-  
edge and attitude of study participants about DF, we  
benchmarked with other studies and considering the  
study population, we were confident of the inter-rater  
reliability and its internal consistency. The internal con-  
sistency assessment using Cronbach's alpha was moder-  
ate reliable ( $\alpha=0.581$ )<sup>34</sup>. We used Statistical Package for  
Social Sciences (SPSS), version 20, in all data analyses.

## Results

### Description of study participants

We recruited 441 adults aged between 18 and 65 (par-  
ticipation rate = 96.7%). A shortfall of 14 (3.1%) par-  
ticipants was due to unwillingness to participate main-  
ly because of the selected potential participant claiming  
too busy with harvesting the crops. Their mean age of  
the study participants was 33.7 (SD=12.0) years. The  
majority, 251 (56.9%) were females, 192 (43.5), young-  
er than 30 years; 280 (63.5%) were married and 269  
(61.0%) had some primary education (Table 1).

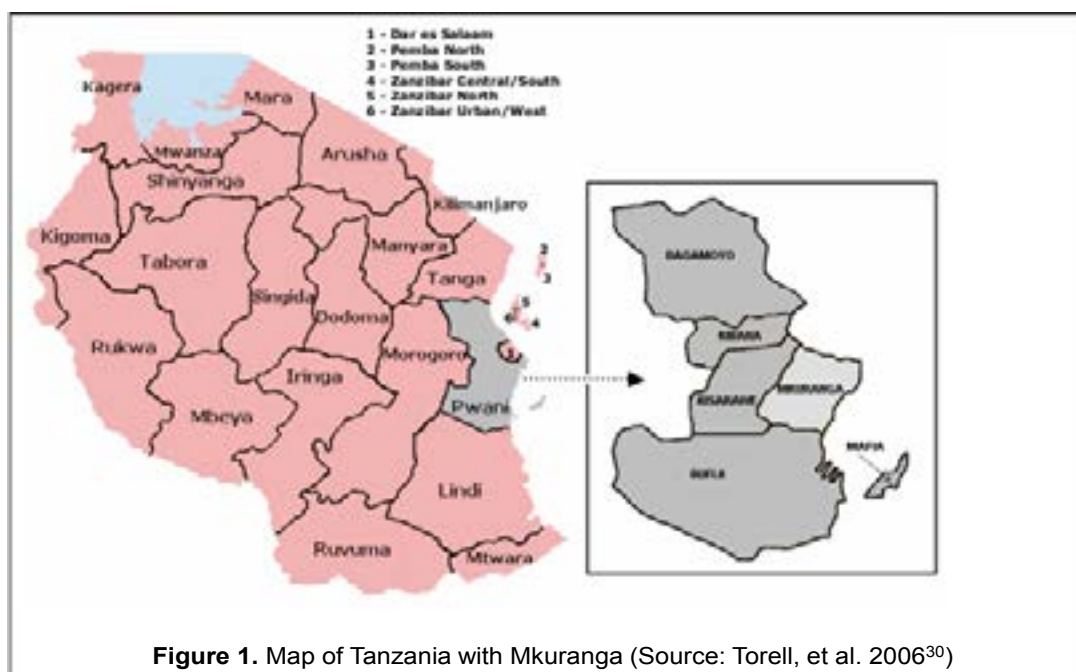


Figure 1. Map of Tanzania with Mkuranga (Source: Torell, et al. 2006<sup>30</sup>)

**Table 1.** Socio-demographic characteristics of the study participants (n = 441)

Characteristics	Number (%)
Sex	
Male	190
Female	(43.1)
Age group (years)	251
< 20	(56.9)
20 – 24	
25 – 29	32 (7.3)
30 – 34	103
35 – 39	(23.4)
40 – 44	57 (12.9)
45 – 49	53 (12.0)
50+	60 (13.6)
Marital status	49 (11.1)
Single	34 (7.7)
Married	53 (12.0)
Cohabiting	
Divorced	116
Separated	(26.3)
Widow	280
Education status	(63.5)
Never in school	8 (1.8)
Primary*	14 (3.2)
Secondary*	9 (2.0)
Above secondary	14 (3.2)
Source of income	
Agriculture	55 (12.5)
Petty business	269
Salaried	(61.0)
Unemployed	93 (21.1)
	24 (5.4)
	174
	(39.5)
	126
	(28.5)
	28 (6.3)
	70 (15.9)

\* Complete or incomplete

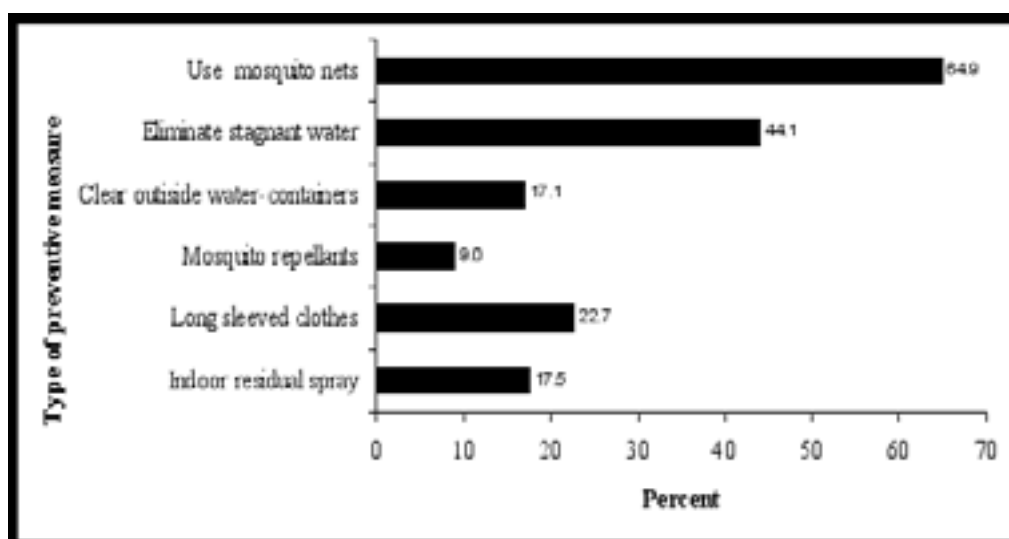
### Knowledge about dengue fever

Among all respondents, 431 (97.7%) reported ever heard of DF. In table 2, we present the average scores for each domain of knowledge assessment. All study

participants thought DF is an airborne or food-borne disease and 97 (22.6%) thought one can get the virus through blood transfusion. Almost one in four of the participants thought the mosquito that transmits DF virus attacks at night (Figure 2).

**Table 2.** Average score of study participants on knowledge of symptoms, transmission, prevention and health seeking about dengue fever (n=431)

Knowledge domain	Total score	Average score	Percentage of knowledge
Symptoms	14	2.0 (SD = 1.4)	14.3
Transmission	8	2.6 (SD = 0.6)	32.5
Prevention	10	2.8 (SD = 1.7)	28.0
Health seeking	2	1.6 (SD = 0.6)	80.0
<b>Total</b>	34	9.5 (SD = 3.1)	2.4



**Figure 2.** Preventive measures against mosquitoes that transmit dengue fever

Overall, the majority, 220 (77.7%) had a low knowledge and 63 (22.3%) had medium knowledge on DF. None of the study participants had a high knowledge. Among all participants, 39 (11.5%) thought dengue is an airborne disease and 347 (80.5%) considered the disease to be curable. Mean knowledge about dengue transmission was 2.6 (SD=0.6) that was statistically significant higher ( $p < 0.01$ ) than the mean score knowledge about symptoms, 2.0 (SD=1.4).

#### Attitude towards dengue fever

Only 76 (19.2%) had positive attitude towards DF prevention, severity of the illness and health seeking be-

haviour. Very few, 29 (6.7%) study participants considered DF a very serious illness, 177 (41.0%) said DF is a non-curable disease therefore no need of going to the health facility and 176 (44.6%) said the only possibility to control DF was when the government kills all mosquitoes in the community.

#### Practices against contracting dengue virus

Among all study participants, 209 (47.4%) reported they practice several measures to prevent themselves against dengue virus. Figure 3 shows different preventive measures against DF. The majority, 137 (64.9%) mentioned netting and 93 (44.1%) eliminating stagnant waters around their houses as measures against DF.

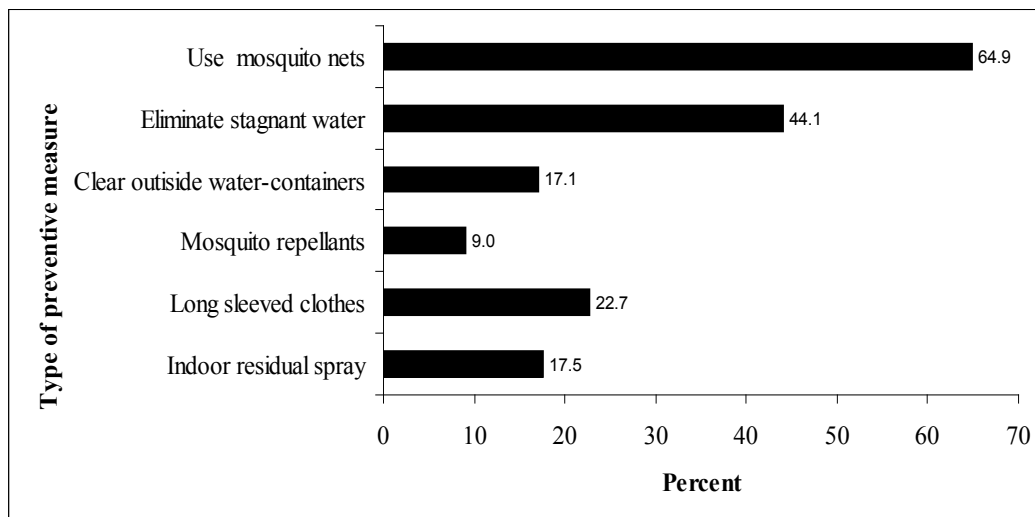


Figure 3. Preventive measures against mosquitoes that transmit dengue fever

### Discussion

This study aimed to assess knowledge, attitude and practices among adult members of the rural communities in one region of Tanzania. Like for many other diseases, these three components have a major contribution when planning to control the spread of DF in the community<sup>35</sup>. In this study, knowledge about dengue fever is poor and the majority have negative attitude towards dengue fever in terms of preventive methods, severity of the disease and in health seeking behavior. Most of the cited practices, for example more than 60% indicating use of sleeping mosquito nets, are not against mosquito bites responsible for dengue virus, therefore not specifically targeting *Aedes aegypti*.

Correct knowledge of dengue transmission, symptoms and good practices are essential in controlling DF before and when there is an outbreak<sup>36</sup>. More than three quarters of the adult communities have low knowledge about dengue transmission, symptoms and preventive mechanisms. However, lower knowledge on symptoms than about the disease transmission has been recently reported in Malaysia. Similarly, the knowledge score of DF in Vietnam was 24% (4.6/19) that was lower than the score in Tanzania, 28% (9.5/34)<sup>37</sup>. Source of low knowledge, especially about transmission, maybe attributed to failure to distinguish between malaria and dengue fevers<sup>38</sup>. Since both dengue and malaria have similar etiologies, community members especially those with low or no education are more likely to confuse some transmission mechanism and prevention. This finding was not surprising because even in the Caribbean, Malaysia and Vietnam, education level was associated with higher knowledge of dengue<sup>37,39,40</sup>. Furthermore, com-

munity members in a neighbouring region of Morogoro perceive most fevers are due to malaria<sup>41</sup>. This finding constitutes one of the evidences for poor knowledge about dengue transmission mechanism among community members.

Vector control measures mentioned in this study that includes netting, indoor residual spray and use of mosquito repellent are also similar preventive measures against *Anopheles* mosquitoes responsible for malaria. Therefore, although correct, but respondents could have been referring to control measures against malaria than DF.

In this study, only about 20% of the respondents have positive attitude towards DF prevention. In Ethiopia, slightly higher than 20% of health care professionals had positive attitude<sup>42</sup>. Therefore, a smaller proportion of adults having positive attitude is an indication of a poor understanding of DF. Good knowledge about DF may not necessarily imply positive attitude on the disease<sup>43</sup>.

This study has several potential limitations. Although we used well-trained research assistants with medical background, it is possible that their outlook (language and physical presentation) influenced respondents offering socially desirable responses leading to desirability bias especially when giving self-report on attitude about DF. We could have reduced this kind of bias by using a self-administered questionnaire, but we were not able to make a prior confirmation of the community literacy level necessary for such data collection technique. We conducted this study in rural settings in Pwani Region. Although technically inference from this study only applies to the study area, knowledge, attitude and practices towards DF may not significantly differ from other

rural populations of Tanzania. However, in-depth qualitative data may give more insight on the subject matter. Furthermore, we propose a study to assess people's views on the development of vaccine towards prevention of dengue in the future.

## Conclusion

Rural adults in Pwani Region of Tanzania with low education status have low knowledge about DF transmission, symptoms and practices. Lack of proper knowledge about disease transmission, symptoms and preventive measures put the population at high risk of contracting the virus. There is need to create or improve friendly, correct and simple information, education and educational messages for the rural populations. These messages could be channeled to the community through the existing platforms. Examples of avenues to convey these messages include available trained community educators, social media, schools and health care providers. Finally, we propose the increased efforts in the development and eventually availability of vaccine against DF towards prevention and elimination of the disease in humans.

## List of abbreviations

DF: Dengue fever; SD: Standard deviation

## Ethical considerations

The Muhimbili University of Health and Allied Sciences Institutional Review Board approved the protocol. The Mkuranga, ward and village government officials provided permission to conduct the study. Before conducting the interviews, we explained the objectives and benefits of the study to each potential study participant. Furthermore, we emphasized voluntary participation such that each participant was free to respond to each question and stopping responding to any question at any point of the interviewing process. We assured each study participant about the strict anonymity and confidentiality during all stages of the study. Before the interviews, each selected study participant signed a consent form or provided a thumb print in case they were unable to write.

## Conflict of interest

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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