Malaria and dengue: Knowledge, attitude, practice, and effect of sensitization workshop among school teachers as health educators

Vikas Kumar¹, Akanksha Rathi¹, Panna Lal¹, Shelesh Kumar Goel¹

¹Department of Community Medicine, Dr. Baba Saheb Ambedkar Medical College and Hospital, New Delhi, India

Abstract

Background and Objectives: Outbreaks of vector-borne diseases (VBDs) such as dengue and malaria can overwhelm health systems in resource-poor countries. Teachers can act as excellent educators by playing a key role of delivering important health education messages to school children and targeting an important health determinant – the health behavior. This study was done to assess the knowledge, attitude, and practice (KAP) of school teachers regarding VBDs and the effect of a sensitization workshop on the same.

Materials and Methods: This is a cross-sectional study done on 212 school teachers to know their KAP regarding dengue and malaria. They were also exposed to an intervention workshop after the pretest, and the gain in knowledge scores was compared. Results: The mean age of respondents was 38.5 years and 57.5% of them were females. Participants had fairly good knowledge about dengue and malaria. More than 90% participants knew that mosquito bite is responsible for dengue and malaria. Around 75% of respondents were also aware of the symptoms of these diseases. The number of participants having a low, medium, and high pretest knowledge score (<50%, 50%–74%, and ≥75%, respectively) was 6.6%, 42.5%, and 50.9%, respectively. A significant improvement was seen in the knowledge score after the intervention workshop ($\chi^2 = 23.6, P < 0.001$). Conclusion: Key success for mosquito-borne diseases control depends not only on services provided by Health Authority but also on knowledge, awareness, preventive practices, and early care-seeking behavior of the community. There is a need to know and improve existing knowledge and practice regarding mosquito-borne diseases and its control in community, especially with the collaboration of school teachers as health educators.

Keywords: Attitudes and practices, dengue, health educator, knowledge, malaria, school teachers

Introduction

Vector-borne diseases (VBDs) are a menace for developing countries[1] due to the explosive number of cases that are reported each year. Outbreaks of VBDs such as dengue and malaria can overwhelm health systems in resource-poor countries.[2] Dengue fever is the most common human arboviral infection globally, transmitted by Aedes aegypti and Aedes albopictus mosquitoes, and is responsible for more illness and deaths than any other arboviral disease.[3,4] The frequency of outbreaks in India has risen with time, and certain states/union territories such as Delhi have become hyperendemic.[5] In 2015, India experienced one of its largest outbreaks (99,913 notified cases; 220 deaths) with Delhi being most severely affected (15,867 notified cases; 60 deaths).[6] Just like dengue, India is plagued with another VBD that is Malaria. Southeast Asia is severely affected with malaria and India contributes 77% of the disease burden in this area.[7]

In the absence of readily available vaccines, environmental management strategies along with personnel preventive measures can effectively reduce the burden of these diseases.[8] Hence, to achieve best results in vector control, it is imperative to have active community participation through improved knowledge...
and health-promoting practices.\cite{8-11} As with many community health problems, the knowledge, attitude, and practices (KAPs) of the population play a major role in implementation of control measures of VBDs.

To combat common diseases, the World Health Organization has proposed the use of lay persons as health educators.\cite{12} Schools provide a critical opportunity to children to learn about common health problems and endemic disease and ways to prevent them. Teachers can act as excellent educators by playing a key role of delivering important health education messages to children and targeting an important health determinant— the health behavior.\cite{13,14}

Despite their importance, little attention has been paid to the role of school teachers as health educators. There is not much research available regarding which areas of prevention could be improved at the population level by promoting health education in schools by teachers.\cite{15} Few studies have shed light on their role as health educators to combat diseases such as AIDS and oral diseases.\cite{16,17} Therefore, there is a need to explore areas of prevention and health promotion that can be converted into successful prevention programs at the school levels with the help of teachers.\cite{18,19}

There is little information on the KAP components of the community in relation to the mosquitoes and their control in India.\cite{20} In addition, the literature available on teacher’s health behaviors is scarce and inconsistent.\cite{21}

Since teachers have a key role in society as educators, this study was carried out to know school teacher’s KAP related to dengue and malaria and the effect of 1-day workshop on their knowledge.

Materials and Methods

Study design and participants

This is a cross-sectional study conducted on 3rd, 5th, 6th, and 7th April 2017. All participants were Municipal Corporation of Delhi (MCD) schoolteachers, which were nodal in-charge of their schools for VBD control activities. The purpose of the study was explained to them and they were asked for their willingness to participate. After clarifications were made, the participants were asked to sign the informed consent form to indicate their understanding and agreement to participate. The study protocol was approved by institutional ethical committee before its use in the study.

Study instrument and data collection

Data were collected with a pretested self-administered questionnaire. The questionnaire covered the following areas: sociodemographic characteristics (sex, age, marital status, education, income, and number of members in household), knowledge, personal experience, attitude, and practices regarding VBDs.

Intervention workshop

After collecting the pretest questionnaire, the participants attended 1-day workshop on prevention and control of VBDs organized by the public health department of MCD, north division. In a duration of 4 days, 212 teachers of 212 schools in north division of MCD attended this. The workshop consisted of lectures and interactive sessions with the help of audio-visual aids. There were demonstrations of models of different mosquitoes, insecticides, and larvae. The session was followed by a discussion and question-answer round. Once the workshop was over, a posttest questionnaire was handed over to the participants to fill.

Data analysis

The characteristics of the study population are presented as means, standard deviations, ranges, and frequency tabulations. Each participant was assigned a knowledge score based on the number of correct or appropriate responses. The scores were further divided arbitrarily in low, medium, and high scores. Those participants who correctly answered 75% or more of questions were termed as high scorers, those who correctly answered between 50%–74% of questions were medium scorers, and rest were low scorers. It was done for both, pre- and post-intervention scores. The answers have been depicted in the forms of tables and frequencies. The association between KAP and associated factors was calculated using Chi-square (or Fisher’s exact test) and a P-value of <0.05 was deemed as significant. The knowledge scores of pre- and posttest were converted into discrete data by categorizing in high, medium, and low scores and were compared using chi-square test.

Results

A total of 212 school teachers participated in the study. The mean age of the participants was 38.57 ± 8.25 years. Almost 60% of the teachers were between 20 and 39 years of age and the remaining were of 40 or more years. The range of age was 20–63 years. The majority were females (57.5%), followed by males (42.5%). Half of the respondents (50%) were graduates, followed by postgraduates (41.5%) and intermediates (8.5%). The socioeconomic status (SES) was calculated according to Modified BG Prasad scale, which takes into consideration the monthly per capita income. According to the same, a very high percentage of teachers (94.3%) fell into the socioeconomic scale category I and the remaining were in categories II–IV [Table 1].

Regarding knowledge of respondents, almost all respondents (99.1%) knew that mosquito bite is responsible for malaria and around three-fourth of them knew that female anopheles mosquito transmits malaria and chloroquin is commonly used in the treatment of malaria. More than 90% of respondents knew that dengue causing mosquito breeds in clean water and bites usually during daytime, 73.6% knew that the vector for dengue is Aedes, and 71.7% knew that aspirin should be avoided in a suspected case of dengue. Three-fourths of the respondents were aware of common symptoms of
dengue (headache, muscle and joint pain, and pain behind eyes) and malaria (high-grade fever with chills and rigors). The number of participants having a low, medium, and high pretest knowledge score (<50%, 50%–74%, and ≥75%, respectively) was 14 (6.6%), 90 (42.5%), and 108 (50.9%), respectively [Table 2].

As far as the attitude of respondents is concerned, more than half (60.4%) of the participants believed that if malaria is not treated on time, then it might turn fatal. Almost 90% participants believed that dengue is a problem in Delhi and it can be prevented. The majority of the teachers (96.2%) believed that it is a collective responsibility of all including government sector, private sector, and community to make efforts toward prevention and control of dengue and malaria. However, a small proportion of teachers (2.8%) think that it is solely the responsibility of government to control these diseases [Table 3].

Regarding experience and practices of school teachers, almost one-fourth of the teachers (23.6%) have acquired malaria or dengue in their lifetime. The majority of respondents (96%) reported that during their last illness, they preferred a government hospital or a qualified doctor for consultation, followed by 4% respondents who preferred self-medication. Few of them used more than one type of treatment modality, and thus responses were not mutually exclusive. A large number of respondents (88%) reported using allopathic medications for dengue and malaria when compared with those using home remedies (16%), Ayurvedic (8%), or homeopathic (4%) treatment. The common personal protective measures used were liquid mosquito repellents (Hit, All Out, Good Night, etc.) (55.7%), followed by mosquito nets (42.5%) and mats, coils, and agarbattis (30.2%). The majority of participants (84.9%) reported that they clean the water container or stagnant water in their houses regularly [Table 4].

The knowledge score or attitude did not differ significantly with factors such as age, gender, education, SES, or ownership of residence. However, few significant associations were found between practices and different independent factors. Almost 40% of participants of 40 years or more acquired dengue or malaria in their lifetime when compared with only 14% among the younger age groups ($\chi^2 = 16.3, P < 0.001$). More number of younger participants (less than 40 years) reported regular emptying of water-filled containers in their houses when compared with older participants (90.6% vs. 76.2%, $\chi^2 = 8.25, P = 0.004$). Participants living in rented houses were more likely to use mosquito bed nets (75%) when compared with those living in self-owned houses (38.3%). Usage of mosquito mats, coils, or agarbattis was more common among males (37.8%) when compared with females (24.6%) [Table 5].

As far as the improvement in knowledge score is concerned after the intervention workshop, it was observed that a significant number of participants scored higher in the posttest than the pretest ($\chi^2 = 23.6, P < 0.001$). The high scorers increased from 50.9% to 72.6% of the total respondents. The medium scorers and low scorers reduced from 42.5% to 25.9% and 6.6% to 1.5%, respectively [Figure 1].

### Discussion

Teacher educators, school principals, and teachers are potentially placed to play a pivotal role in preventing diseases and inculcating health-promoting behaviors. Schools are already playing an important role in sensitization of children regarding noncommunicable diseases and their risk factor...
The mean age of the participants in this study was similar to that reported by other studies. In this study, the majority of teachers were females. Similar observations have been reported in other studies. In this study, it has been reported that a large number of teachers were graduates and postgraduates, which is much more than that reported in a study done by Metuh and Ikeye in school teachers in Nigeria. The possible explanation may be that in India education begins early and majority of professionals opt for postgraduation. The ownership of house reported in this study is also similar to that reported by a study done by Alobuia et al. in Jamaica.

The study participants had a fairly good knowledge about transmission and symptoms of malaria. In this study, almost all respondents (99.1%) knew that mosquitoes transmit malaria. Similar observations (70%–90%) have been made in other studies. On the contrary, the study done by Alobuia et al. in Jamaica reported a much smaller figure (39%). The authors have reported that the reason for such poor knowledge is that Jamaica is not a country where malaria is endemic, and only a small portion of individuals knew anyone who had been diagnosed with dengue or malaria. Another reason might be that study participants in our study were teachers while they were patients and their relatives in the Jamaica study.

Three-fourth of the respondents in this study knew that fever with chills and rigor is characteristic of malaria. The observation is congruent to those reported in other studies. However, De et al. from Siliguri, India, reported that 97% had good knowledge regarding clinical features of malaria such as fever, shivering, headache, and vomiting. The reason is that Siliguri is highly endemic for malaria and the awareness level of people is good.

In this study, the study participants were mostly aware about the biting time and breeding sites of mosquito vector of dengue. About 95% of participants knew that biting time of Aedes is during the day. Contrarily, Alobuia et al. in Jamaica reported that only 2.5% of the study participants knew that biting time of Aedes was daytime. The reason may be that participants of our study are teachers and mostly are from good socioeconomic background.

About 92% of respondents knew that dengue vector breeds in clean stagnant water in this study. The figure is much higher than that reported by a study done by Boratne et al. in Puducherry (60.69%). The reason for this observation is that the Puducherry study was carried out in periurban areas and the study population mainly consisted of housewives and daily wagers, whose awareness level might be lower than that of the participants in this study.

The attitude of respondents in this study was observed to be majorly favorable as 60% of them thought of malaria as a serious disease and 85.8% thought dengue to be a serious problem in Delhi. Similar observations have been made (47%–96%) in other studies where community people from different geographical areas have perceived mosquito-borne diseases as a serious problem. Another positive observation seen such as obesity. Because teachers have a generally higher social status in a community and a high degree of contact with students and parents, they can be effective stakeholders in the fight against VBDs. In a semiliterate society, the school child may well be the first in the family to be educated. The information he carries home may be seen as modern, reliable, and believable. This study was aimed to assess school teacher’s KAPs related to dengue and malaria. It was also aimed to assess the effect of 1-day workshop on the knowledge of participants.

The mean age of the participants in this study was similar to that reported by other studies. In this study, the majority of participants

### Table 3: Attitude of the study participants regarding malaria and dengue

| Beliefs                                      | Responses          | Frequency (%) |
|---------------------------------------------|--------------------|---------------|
| Belief about fatality of malaria            | Ordinary disease   | 32 (15.1)     |
|                                             | Serious disease    | 26 (12.3)     |
|                                             | If not treated in time, patient may die | 128 (60.4) |
|                                             | No idea            | 26 (12.3)     |
| Belief about possibility of prevention of dengue | Yes               | 186 (87.7)    |
|                                             | No idea            | 26 (12.3)     |
| Belief about dengue being a problem in Delhi | Yes               | 182 (85.8)    |
|                                             | No                 | 12 (5.7)      |
|                                             | No idea            | 18 (8.5)      |
| Belief about responsibility of malaria/dengue prevention and control | Government agencies only | 6 (2.8) |
|                                             | Collective responsibility of government and community | 204 (96.2) |
|                                             | No idea            | 2 (0.9)       |

### Table 4: Practice of the study participants regarding malaria and dengue

| Practices                                      | Responses           | Frequency (%) |
|-----------------------------------------------|---------------------|---------------|
| Whether suffered from dengue or malaria ever | Yes                 | 50 (23.6)     |
|                                               | No                  | 150 (70.8)    |
|                                               | No response         | 12 (5.7)      |
| Preferred health facility for consultation during last episode of dengue or malaria | Government hospital | 24 (48.0)     |
|                                               | Qualified doctors in private clinic | 24 (48.0) |
|                                               | Self-medication     | 2 (4.0)       |
| Type of medicines taken during last episode of dengue or malaria* | Allopathic | 44 (88.0) |
|                                               | Ayurvedic           | 4 (8.0)       |
|                                               | Homeopathic         | 2 (4.0)       |
|                                               | Home remedies       | 8 (16.0)      |
| Personal protective methods used against mosquito bites* | Mosquito net | 90 (42.5) |
|                                               | Mats, coil, agarbatti | 64 (30.2)   |
|                                               | Hit, All Out, Good Night | 118 (55.7) |
|                                               | Fast moving fan     | 48 (22.6)     |
|                                               | No response         | 10 (4.7)      |
| Regularly empty water container or stagnant water in the house | Yes | 180 (84.9) |
|                                               | No                  | 20 (9.4)      |
|                                               | No response         | 12 (5.7)      |

*Multiple responses
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in the attitude of the current study participants is that 96.2% respondents believed that both the government and the people are responsible for mosquito management and control and only 2.8% responded that the government is solely responsible for the same. On the contrary, Aloubia et al.[24] have reported that 55% of the participants responded that both the government and the people in their communities are responsible for mosquito management and keeping their environment safe and 20% of the respondents believed that the government was solely responsible. It is imperative for the community to accept that source reduction and disease control is a collective responsibility as the most common breeding sites in India for Aedes aegypti are identified as cement tanks and plastic containers.[31,32] These sites are in proximity of houses and thus demand a vigil eye by the community members.

Surprisingly, almost one-fourth of respondents in this study reported having dengue or malaria in their lifetime, which is much more than that reported in another study.[2] The reason for the same might be that any fever during dengue or malaria season can be easily mistaken and reported as dengue and malaria without laboratory confirmation.

The practices of the participants in this study were also very encouraging as the majority of respondents (96%) reported that they preferred a registered practitioner or government hospital for getting treated for dengue or malaria. A similar preference has been reported by Dhaduk et al.[27] and Aloubia et al.[24] On the other hand, only 4% reported self-medication as an option, which is much lesser that that reported in a study by Kumar and Gururaj[28] in Karnataka (18%). The reason for this practice

| Whether suffered from malaria/dengue ever | Yes (%) | No (%) | Total (%) | χ², df, P |
|-----------------------------------------|---------|--------|-----------|-----------|
| Age                                     |         |        |           |           |
| 20-39 years                              | 18 (14.1) | 110 (85.9) | 128 (60.4) | 16.3, 1,000 |
| >40 years                                | 32 (38.1) | 52 (61.9) | 84 (39.6)  |           |
| Total                                    | 50 (23.6) | 162 (76.4) | 212 (100.0)|           |

| Frequently empty water-filled container or stagnant water at home | Yes (%) | No (%) | Total (%) | χ², df, P |
|-----------------------------------------------------------------|---------|--------|-----------|-----------|
| Age (years)                                                     |         |        |           |           |
| 20-39                                                           | 116 (90.6) | 12 (9.4) | 128 (60.4) | 8.25, 1, 0.004 |
| >40                                                             | 64 (76.2) | 20 (23.8) | 84 (39.6)  |           |
| Total                                                           | 180 (84.9) | 32 (15.1) | 212 (100.0)|           |

| Use of mosquito nets as personal protective method against mosquitoes | Yes (%) | No (%) | Total (%) | χ², df, P |
|---------------------------------------------------------------------|---------|--------|-----------|-----------|
| Ownership of residence                                              |         |        |           |           |
| Rented                                                              | 18 (75.0) | 6 (25.0) | 24 (11.3) | 11.7, 1, 0.001 |
| Self-owned                                                          | 72 (38.3) | 116 (61.7) | 188 (88.7) |           |
| Total                                                                | 90 (42.5) | 122 (57.5) | 212 (100.0)|           |

| Use of mats, coil, and agarbatti as personal protective method against mosquitoes | Yes (%) | No (%) | Total (%) | χ², df, P |
|--------------------------------------------------------------------------------|---------|--------|-----------|-----------|
| Gender                                                               |         |        |           |           |
| Female                                                               | 30 (24.6) | 92 (75.4) | 122 (57.5) | 11.7, 1, 0.039 |
| Male                                                                 | 34 (37.8) | 56 (62.2) | 90 (42.5)  |           |
| Total                                                                 | 64 (30.2) | 148 (69.8) | 212 (100.0)|           |

| Use of liquid repellent vaporizers (Hit, All Out, Good Night) as personal protective method against mosquitoes | Yes (%) | No (%) | Total (%) | χ², df, P |
|----------------------------------------------------------------------------------------------------------------|---------|--------|-----------|-----------|
| Education                                                          |         |        |           |           |
| Intermediate                                                       | 2 (11.1) | 16 (88.9) | 18 (8.5)  | 15.9, 2, 0.000 |
| PG                                                                  | 54 (61.4) | 34 (38.6) | 88 (41.5) |           |
| Graduate                                                            | 62 (58.5) | 44 (41.5) | 106 (50.0) |           |
| Total                                                               | 118 (55.7) | 94 (44.3) | 212 (100.0)|           |

**Table 5: Practice of the study participants regarding malaria and dengue prevention and associated factors**

**Figure 1:** Improvement in knowledge score of participants after intervention workshop. The figure shows that respondents falling in the high scorer category have increased and those falling in the medium and low scorer categories have decreased, following the intervention workshop. The high scorers increased from 50.9% to 72.6% of the total respondents. The medium scorers and low scorers reduced from 42.5% to 25.9% and 6.6% to 1.5%, respectively.
might be the high level of awareness of the study participants. The second reason might also be the fear of dengue during transmission season as the frequent outbreaks of dengue in the city, which leaves many dead, creates panic among the community.

A sizeable proportion of the respondents were using personal prophylaxis measures against mosquitoes, which is again reflective of the high awareness level. One-third of the participants reported using mosquito coils and mats, which is similar to the observation reported by another study. The maximum number of respondents (more than half) used liquid repellent vaporizers. Similar findings have been reported in other studies. A large number of respondents (42.5%) also used mosquito nets for personal protection. The findings are not congruent with other studies, which reported a much lesser prevalent use of nets (14.4%–35%). Mosquito nets are frequently used in Delhi due to the high density of mosquito population that remains stable almost throughout the year.

An encouraging practice reported in this study is that a large number of respondents reported emptying the water containers in their house regularly, which is more than that reported by other studies. The education and awareness campaigns conducted in the city seem to be responsible for spreading the message of source reduction.

In this study, it is seen that the knowledge score or attitude did not differ significantly with sociodemographic factors such as age, gender, education, SES, or ownership of residence. Few studies have reported similar observations.

However, personal experience and few practices were found significantly associated with few demographic factors. In this study, it was found that older respondents were more likely to be affected by dengue or malaria in their lifetime. The reason for the same is that they had been exposed for a longer time to acquiring these diseases due to their age. More number of younger respondents empty the containers in and around their house as they are more active and probably are more health conscious. Another interesting finding reported in this study is that participants living in rented houses were more likely to use mosquito bed nets (75%) when compared with those living in self-owned houses (38.3%). The reason being that home-owner may have better housing conditions like permanent net or screening on windows and live in better conditions thus are less concerned about the mosquito problem.

An important finding reported in the study is the significant improvement in knowledge score of the participants following health education workshop. In view of the foregoing conclusions, health education workshops and campaigns may deem helpful in improving the awareness among particular groups like teachers. Evidence from prior researches also supports this fact as effective reduction of vector breeding sites was observed to be achieved by community education alone rather than use of chemical methods.

This study emphasizes on the use of school teachers as health educators. This will greatly reduce the burden on primary care physicians – who are the first point of contact for continuing healthcare of members of the community. The primary care physicians have to have a wide knowledge on all subjects and are expected to provide treatments, preventive care, and health education. Their work will become easier with the intersectoral collaboration of health and education sectors.

This study has certain limitations, which must be taken into consideration when interpreting the results. First, our assessments of attitudes and practices toward VBDs and vector control have relied on self-reported data collected through self-administered questionnaires and could be affected by bias. Second, we have included in the study a particular cohort of professionals (teachers), whose awareness level is expected to be high. In addition, they are well-educated and thus there is a significant improvement in the already high knowledge scores. The interpretation cannot be extrapolated on general population as the education level and awareness might not be at par. However, despite these limitations, our findings contribute to our understanding of KAP regarding VBDs in school teachers in Delhi and can be used to develop interventions designed to improve vector control and reduce transmission of these diseases in the region and possibly the country.

**Conclusion**

Despite so many efforts to control malaria, dengue, and chikungunya, these diseases are still having a huge impact on health, well-being, and economy of the people. Key success for mosquito-borne diseases control depends not only on services provided by health authority but also on knowledge, awareness, and practices for prevention and early care-seeking behavior of the community. There is a need to know and improve existing knowledge and practice regarding mosquito-borne diseases and its control in community. In addition, innovative interventions like actively involving school teachers to spread health education messages must be explored to improve the KAPs of the community, which in turn will affect the burden of diseases.

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**Conflicts of interest**

There are no conflicts of interest.
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