Cultural Conceptions about Dengue in Nayarit, Mexico

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Abstract

The goal of this study was to explore the conceptual dimensions of dengue in three locations in the state of Nayarit, Mexico, for the purpose of identifying community attitudes towards preventive measures. It was an exploratory cross-sectional study. The sample was 122 people selected by propositive sampling in three locations with different levels of dengue prevalence. Semi-structured interviews were applied by using free-listing techniques and pile sorts. Dengue-associated terms and conceptual dimension groupings were investigated. A consensual analysis was applied by factorizing the major components as well as a dimensional analysis with hierarchical conglomerates and multidimensional scales. The main results show the existence of structured cultural domains with abundant descriptive information about the disease coming from direct experience and socialization sources, and variables according to the population density of the localities. Nevertheless, the domains included scant preventive elements and no reference to social participation. Cultural elements should be considered when designing and disseminating dengue prevention campaigns. The campaigns should emphasize specific preventive measures and favour strategies fostering the conscious incorporation of social participation in the dengue prevention culture.

Keywords: Dengue, prevention, cultural conceptions, consensus.

Introduction

The official health system in Mexico has promoted a preventive-type programme based on mobilizing technical personnel in communities to check “patios” (water storage containers) and apply larvicide temephos (Abate) and insecticide (mist spraying), and disseminating information material by different mass media.

The main dengue prevention programme in Mexico is called “Clean Patio and Stored Water Care” (‘Patio limpio y cuidado del agua almacenada’), including sweeping, weeding, and tidying up and controlling containers or breeding sites. These actions should be performed by organized inhabitants monitored by health sector promoters. Nevertheless, the programme has a limited scope and some confusing elements. For instance, the population is told that it should change water every 3 or 5 days to clean water containers, without explaining that the Aedes aegypti mosquito also breeds in clean water.

An absence of self-administered community participation has not been promoted in this programme, and the main...
reason for this could be the overconfidence of government authorities in routine application of larvicides and insecticides as a way to eradicate the causes of the disease.\[1]\n
The factors responsible for dengue propagation require prevention programmes that incorporate communities’ points of view and foster social participation in source-reduction activities for the Aedes aegypti mosquito.\[2\]. We believe that to be able to involve a community in prevention programme, we must try to understand its cultural norms, systems and social practices concerning prevention and sickness, taking into account that many communities’ definitions of what constitutes a disease have no parallel in the biomedical field.\[3\]

In this context, the purpose of this study was to explore the conceptual dimensions of dengue in three Mexican locations with high prevalence of the disease, for the purpose of identifying community attitudes towards preventive measures.

Material and methods

Study area

The study was made in two urban locations (Santiago and Villa Hidalgo) and one rural location (Santa Cruz) in the state of Nayarit, Mexico. They were selected for being in two municipalities with high classic and haemorrhagic dengue prevalence in 2005. The first two locations, located in the municipality of Santiago Ixcuintla, reported 167 cases of dengue fever (DF) and 42 cases of haemorrhagic dengue, while the third location, in the municipality of San Blas, reported 51 cases of DF and one case of haemorrhagic dengue. The total number of cases in the state of Nayarit in 2005 was 339 cases of DF and 58 cases of haemorrhagic dengue. The municipalities in this study reported 54.6% of DF and 91.3% of the total haemorrhagic dengue cases.\[4\]

The state of Nayarit is located in western Mexico along the Pacific coast. Santiago Ixcuintla had 18 169 inhabitants in 1999, while Villa Hidalgo had 11 175 inhabitants and Santa Cruz 1569 inhabitants. The first two locations have a hot dry climate and their soil has hydrophilic mangrove vegetation with large bodies of saltwater. The last location has a hot climate with beaches, estuaries and tidal pools covering extensive areas of lagoons and swamps.\[5\]

Data collection

Information was gathered systematically with a cognitive anthropological approach to study how the subjects from different cultures acquired information and processed it to make decisions and acted according to the normative values of their surroundings.\[6\] The study design was an exploratory cross-sectional study with levels of descriptive and correlational analysis. During the first stage of the interviews, the free-listing technique was applied to achieve a repertory of terms that enabled the application of pile sorts’ technique, for the purpose of describing the organization of the different conceptual dimensions that the informants built around dengue.

The work involved two successive information-gathering exercises between March and April 2005, one with the free-listing and the other with the pile sorts techniques. Sixty-two informants were interviewed for the first gathering and 60 for the second. During the free-listing phase, 21 informants in Santiago, 21 in Villa Hidalgo and 20 in Santa Cruz were interviewed. For the second pile sorts’ phase, 60 informants (20 from each locality) were interviewed.
The sample size in each context was based on the Romney et al. cultural consensus model[7] for studying cultural patterns. Their supposition poses that the sampling size for cultural description studies should not be large since the average correlation among informants tends to be high (0.5 or more). In this sense, Weller and Romney[8] suggest a minimum size of 17 informants to classify 95% of the questions correctly, with an expected cultural competency average (the ratio between individual responses and the estimated pattern of correct responses for the group) of 0.5 and a reliability level of 0.95.

The sampling strategy for selecting the interviewees was propositive non-probabilistic[9] aimed at finding certain characteristic variations among the informants: gender, age and different experiences with dengue (they themselves report whether or not they have suffered clinically-diagnosed and laboratory-confirmed dengue).

The interviews were conducted on the streets and in the informants’ houses in each locality. The purpose of the study was explained prior to each interview and oral informed consent was given to guarantee the informants confidentiality and anonymity during information-gathering and analysis. Interviewee participation was subject to voluntary acceptance.

Information techniques were aimed at describing the cultural domain of dengue. Cultural domain in cognitive anthropology is understood as an organized set of words or phrases that, at different cognitive levels, make reference to a specific conceptual sphere.[8] In this sense, the free listing technique was applied during the first phase of the study.\(^8\) The technique consisted of asking the informants for a written list of terms or phrases related to a particular conceptual sphere, in this case the word dengue. After obtaining the lists of words, the terms were tabulated according to the frequency of mention, allowing us to choose 21 terms from each list which enabled the creation of gathering-instruments for pile sorts[8] that were applied in the second phase of the study. This technique consisted in preparing cards for each term (21 different cards for each context) and asking the informants to group the cards having the most similar terms, no matter how many groups they made. Afterwards, they were asked to label each group with a word that identified the set of selected cards.

The information produced during both gathering phases was tabulated in matrices word by word and their values converted into similarity ratios. The resulting matrices were analysed separately for added values and individual values. In the case of added values, the matrices were analysed by hierarchical conglomerates.[6] This method assigns words to conceptual dimensions according to the similarities perceived by the informants. The extent of similarity between words was shown in a tree diagram chart with correlation levels. It was complemented by a two-dimensional spatial representation of the similarities of the words represented in the conglomerate trees by means of non-metric multidimensional scales (MDS). MDS is almost always used as a descriptive model for representing and understanding the appropriate dimensionality of data. The central motivating concept of MDS is that the distances between points should correspond to the proximities. A measure of fit widely used in MDS is “stress”, which is the sum of correspondences between pairs of objects within a spatial representation. When using stress as a guide to dimensionality, it’s assumed that each value is reasonably close to the true minimum stress value for the dimensionality involved. In this work we followed Sturrock and Rocha’s proposal[10] that suggests a cut-off stress value of less than 0.28 for a representation of 20 terms, and a value less than 0.23 for 15 terms.
In the case of individual values, the matrices were analysed with a cultural consensus model adjusted for ordinal responses. This model estimates the likelihood of a homogeneous system of knowledge prevailing in a culture based on the correspondence between group knowledge and individual knowledge. Factorial analyses of the main components grouping individuals in function of their responses were made for this purpose. The adjustment dependability criterion to obtain the consensus of models implies that the first factor ratio (F1) achieves a ratio three times greater than the second factor ratio (F2), meaning that there is a high degree of agreement of the informants’ answers. An accumulated percentage of the variance >60% in F1 is a complementary indicator of high degree of agreement. The model also estimates the following two measures for the first two factor ratios: (i) cultural competency: the arithmetical group mean of the extent of agreement of each informant with the average answers; and (ii) group agreement: cultural competency elevated to the square.

The different analyses were processed with the ANTHROPAC v. 4.1 package.

**Results**

**Characteristics of the study group**

Of the 122 interviewees in the group, 50.8% were women and the rest men. The mean age was 38 years (38.5 in Santiago, 42.3 in Villa Hidalgo and 34.4 in Santa Cruz). 27% of them self-reported having suffered from some kind of dengue at some time (9 in Santiago, 13 in Villa Hidalgo and 11 in Santa Cruz).

**Free listing**

The most frequently mentioned words by the informants when the free-listing technique was applied were classified into three categories: descriptive elements of the concept of dengue (which in turn are classified into lexicon = synonyms of the term; composition = elements making up the concept of dengue and neighbourhood and other related words); practices (classified into dengue-related actions and functions); and attributes (adjectives or descriptive words), as described in Table 1.

The greatest number of words in Santiago was found in the descriptive components, mainly those concerning the neighbourhood and having to do with containers and sites serving as reservoirs for mosquito breeding. As for the practices that were mentioned, there is the action of a mosquito bite that spreads the disease as well as an omitted action (lack of cleanliness) that is needed to prevent it. As for disease functions, they cause infection as well as death when dengue is not treated in a timely fashion.

The largest number of words in Santa Cruz centred on descriptive aspects such as references to dengue symptoms and other diseases with similar symptoms. The practices underscored ‘cleaning’ as a way to avoid the disease as well as fumigation as a way to eliminate mosquitoes. This was the only location that mentioned attributes (fear caused by the disease and filth (‘suciedad’) as a way to qualify the origin of the disease).

In the case of Villa Hidalgo, the largest number of words also focused on descriptive aspects, specifically those concerning composition. Not unlike Santa Cruz, they made reference to dengue symptoms and other diseases with similar symptoms. As for practices, they underscored mosquito bites that spread the disease as well as an omitted action (lack of cleanliness) that was needed to prevent dengue. According to a lady interviewed in Villa Hidalgo, ‘A lot of time it (the disease)
### Table 1: Words most frequently found on the lists in each of the contexts studied in the state of Nayarit, México, 2005

<table>
<thead>
<tr>
<th>Descriptive</th>
<th>Santiago</th>
<th>Santa Cruz</th>
<th>Villa Hidalgo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lexicon</strong></td>
<td>Disease</td>
<td>Disease</td>
<td>Disease</td>
</tr>
<tr>
<td>Neighbourhood</td>
<td>Haemorrhagic</td>
<td>Mosquito</td>
<td>Haemorrhagic</td>
</tr>
<tr>
<td></td>
<td>Virus</td>
<td>Stagnant Water</td>
<td>Virus</td>
</tr>
<tr>
<td></td>
<td>Mosquito</td>
<td>Junk</td>
<td>Mosquito</td>
</tr>
<tr>
<td></td>
<td>Stagnant water (‘agua estancada’)</td>
<td>Climate</td>
<td>Stagnant water</td>
</tr>
<tr>
<td></td>
<td>Junk (‘cacharros’)</td>
<td>Tyres</td>
<td>Junk</td>
</tr>
<tr>
<td></td>
<td>Medicine</td>
<td>Weeds (‘maleza’)</td>
<td>Medicine</td>
</tr>
<tr>
<td></td>
<td>Tyres</td>
<td>Garbage</td>
<td>Herbs (‘hierba’)</td>
</tr>
<tr>
<td></td>
<td>Troughs (‘pilas’)</td>
<td>Troughs</td>
<td>Troughs</td>
</tr>
<tr>
<td>Composition</td>
<td>Fever</td>
<td>Fever</td>
<td>Fever</td>
</tr>
<tr>
<td></td>
<td>Aching bones (‘dolor de huesos’)</td>
<td>Aching bones</td>
<td>Aching bones</td>
</tr>
<tr>
<td></td>
<td>Headache</td>
<td>Headache</td>
<td>Headache</td>
</tr>
<tr>
<td></td>
<td>Vomit</td>
<td>Vomit</td>
<td>Vomit</td>
</tr>
<tr>
<td></td>
<td>Chills (‘escalofrío’)</td>
<td>Chills</td>
<td>Chills</td>
</tr>
<tr>
<td></td>
<td>Influenza (‘gripe’)</td>
<td>Influenza</td>
<td>Influenza</td>
</tr>
<tr>
<td>Attributes</td>
<td>Waist pains (‘dolor de cintura’)</td>
<td>Waist pains</td>
<td>Waist pains</td>
</tr>
<tr>
<td></td>
<td>Diarrhoea</td>
<td>Diarrhoea</td>
<td>Diarrhoea</td>
</tr>
<tr>
<td></td>
<td>Loss of appetite</td>
<td>Loss of appetite</td>
<td>Loss of appetite</td>
</tr>
<tr>
<td></td>
<td>Sore throat (‘dolor de garganta’)</td>
<td>Sore throat</td>
<td>Sore throat</td>
</tr>
<tr>
<td>Practices</td>
<td>Actions</td>
<td>Functions</td>
<td>Attributes</td>
</tr>
<tr>
<td></td>
<td>Bites (‘piquete’)</td>
<td>Death</td>
<td>Filth (‘suciedad’)</td>
</tr>
<tr>
<td></td>
<td>Lack of cleanliness (‘falta de aseo’)</td>
<td>Infection</td>
<td>Fear</td>
</tr>
<tr>
<td></td>
<td>Fumigation</td>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cleanliness (‘limpieza’)</td>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bites</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of cleanliness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Free listings
occurs because you’re not careful; sometimes poverty is confused with filth (‘suciedad’), but no matter how poor (‘humilde’) a house is, it must be clean.” As for disease functions, mention was made that they caused infection when dengue did not receive medical treatment.

**Conceptual dimensions of dengue**

The conceptual dimensions found in Santiago (Figure 1) by conglomerate analysis were dengue symptoms and treatment (in this regard, one person mentioned the importance of applying serum “to have more blood and more strength and to get better”). Other dimensions were the consequences of suffering from dengue when it involved a death (one informant pointed out: “Haemorrhagic is the strongest and most dangerous kind; it can kill you.”); causes of the disease (where the terms ‘mosquito’, ‘bite’ and ‘virus’ were located) and mosquito reservoirs or breeding sites (some informants mentioned “foul dirty water days old (‘aceda, sucia’) or stagnant, that’s where the disease is made”, “it’s where the mosquito larva is”).

The conceptual dimensions mentioned in Villa Hidalgo (Figure 2) were: the consequences of suffering from haemorrhagic dengue (two informants said, “When you get haemorrhagic dengue, they isolate you and you become depressed”, “It’s a sickness that can be fatal if not treated in time”), treatments, dengue symptoms (one informant said, “I felt like I was falling, like when I’m drunk, but without drinking any alcohol”), and those of other infections, and causes of the disease (when the place where the virus develops was included). One lady said, “I heard on the radio that a lot of people around us have gotten sick.”

The conceptual dimensions mentioned in Santa Cruz (Figure 3) were: causes and
Figure 2: Dengue dimensions by hierarchical conglomerates, Villa Hidalgo, Nayarit, April 2005

Figure 3: Dengue dimensions by hierarchical conglomerates, Santa Cruz, Nayarit, April 2005
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dengue reservoirs (one informant mentioned: “People are too lazy to dispose of garbage and they throw it into creek beds and pollute the air”); prevention through cleaning and fumigation, and symptoms (some informants mentioned “headache and brain ache ‘dolor de cerebro’, I couldn’t turn my head”, “aching bones” ‘dolor de huesos’, “all the joints ‘coyunturas’: my hands, arms, and knees produce a jabbing pain ‘punzadas’, chills that come over you in small waves ‘olitas’ breaking against you from the top down.” Two terms (climate and fear) were not included in the cultural domain of dengue.

Dimensions described by the conglomerate trees have adequate adjustment dependability values in all localities (stress <0.280 in the three cases: Santiago = 0.066, Villa Hidalgo = 0.085, and Santa Cruz = 0.048) in the non-metric multidimensional scale analysis. In comparative terms, the informants from Santiago and Villa Hidalgo structured the cultural domain of dengue with more or less similar dimensions: symptoms, haemorrhagic dengue, reservoirs, treatment and causes (reservoirs and lack of hygiene). The Santa Cruz informants structured it in three dimensions: symptoms, reservoirs and causes. They did not include the treatment dimension but did mention prevention by means of cleanliness and fumigation practices. The term “hygiene” in Santiago and Villa Hidalgo was considered in the sense of a lack of cleanliness that causes the disease or that produces conditions for the development of reservoirs, while the reference to hygiene in Santa Cruz was in the sense of preventive measures.

**Cultural consensus about the conception of dengue**

The conceptual organization of the different dimensions of dengue showed cultural consensus in the three contexts studied (Table 2). It reached higher levels in Santa Cruz and Villa Hidalgo (the Santa Cruz factor ratio 1 = 5.4 and the Villa Hidalgo factor ratio 1 = 4.9).  

**Table 2: Cultural consensus levels of knowledge about dengue in the three contexts (expressed in factorial eigenvalue ratios, accumulated percentage of the variance of factors, means of cultural competencies and group agreement), April 2005**

| Context       | Factor ratio 1 (F1) | Accumulated variance % | Factor ratio 2 (F2) | Accumulated variance % | Ratio F1:F2 | Cultural competency* Mean | SD | Group agreement** |
|---------------|---------------------|-------------------------|---------------------|-------------------------|-------------|---------------------------|--|--|------------------|
| Santiago      | 3.469               | 71.7                    | 2.690               | 93.3                    | 1.28        | 0.63                      | 0.50 | 0.34             |
| (n = 20)      |                     |                         |                     |                         |             |                           |     |                  |
| Villa Hidalgo | 4.873               | 76.7                    | 2.096               | 92.5                    | 2.32        | 0.65                      | 0.18 | 0.42             |
| (n = 20)      |                     |                         |                     |                         |             |                           |     |                  |
| Santa Cruz    | 5.361               | 79.5                    | 2.604               | 94.3                    | 2.05        | 0.63                      | 0.18 | 0.34             |
| (n = 20)      |                     |                         |                     |                         |             |                           |     |                  |

Source: Analysis pile sorts consensus

SD: Standard deviation

*Cultural competency: The arithmetical group mean of the extent of agreement of each informant with the average answers

**Group agreement: Cultural competency elevated to the square
than in Santiago (factor ratio 1 = 3.5). In all three contexts, the accumulated percentage for the variance for factor ratio 1 was greater than 70%, and the individual cultural competency mean was greater than 0.6; thus, these values confirmed cultural consensus. Values greater than 0.3 in the group agreement measurement describe conceptual organization homogeneity of the dimensions and also validate consensus.

**Discussion**

The dengue conception was the simplest and most homogeneous in the locality of Santa Cruz that is characterized by less population density. The cultural domain of the locality had three dimensions and a higher consensus level than the other two localities. The cultural domains in the localities with the higher population densities (Santiago and Villa Hidalgo) had more conceptual dimensions (five and six respectively) and lower levels of cultural consensus than in Santa Cruz. This finding suggests that the conceptual construction of dengue is more complex and structured in localities with denser population in spite of the fact that there is a homogeneous conception in all locations based on the long experience of inhabitants with the disease.

The essential difference between the localities studied was found in two aspects of the cultural domain structuring. On the one hand the conception of hygiene is presented differently, as an omitted practice in Santiago and Villa Hidalgo and as a qualifier in the case of Santa Cruz (filth ‘suciedad’). This could imply the identification of specific problems of lack of hygiene in at least two of the localities, while in the case of Santa Cruz, the handling of negative attributes could be related as something a bit alienated from the disease itself with a moral sense of justifying cleanliness as a kind of purification, and to blame the disease on poorer or less educated people. Lennon[12] found in his study that the inhabitants considered that people’s attitude problems such as lack of education and knowledge as well as apathy and laziness are the reason why people fail to establish measures to control dengue-bearing mosquitoes. Besides, Santa Cruz being a small town, social control mechanisms based on socially shared moral criteria facilitate descriptive phrases for the dengue problem, resulting in it being the only town that included attributes in the words found in the free listings (filth ‘suciedad’ and fear).

The second differential aspect was that haemorrhagic dengue was not mentioned in Santa Cruz within the cultural domain; this could be related to the occurrence of just one case of haemorrhagic dengue in the municipality during 2005.

The main similarity found in the three contexts was that there was no mention of a self-administered preventive culture based on community participation in any of them. The terms ‘fumigation’ and ‘cleanliness’ are mentioned in Santa Cruz as practices related to actions by public prevention entities, but there is no reference to prevention in the other localities. This preventive culture may be associated with the local implementation of the official “Clean Patio and Stored Water Care” programme. Fumigation in the sites of this study is done with minimal community participation, consisting of people opening the windows and doors of their homes so the insecticide can enter as well as receiving Abate from health personnel to deposit it in water containers. In this context, organized community participation as foreseen in the programme is limited and secondary to the programme’s vertical format.

This finding of a lack of a self-administered preventive culture is similar to the findings of
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a previous study\textsuperscript{[13]} where regulatory classification patterns prevailed in the three localities studied (Jalisco, Chiapas and Colima); the informants conceived public actions developed by official health institutions to be crucial while they attached less importance to community and individual participation measures. Previous studies made in Colima and Tapachula (Chiapas) under the behavioural theory approach provide grounds for thinking that, on the one hand, the said conception could be the result of the vertical prevention campaign measures that have been promoted for years. It could also be part of a mechanism whereby knowledge and beliefs about dengue do not encourage modifying individual prevention practices. Espinoza-Gomez et al.\textsuperscript{[14]} made an experimental assessment in Colima about the impact of three kinds of interventions (chemical, educational and chemical-educational). They found that the inhabitants did not increase the practice of eliminating breeding sites substantially due to the false sense of security given by official fumigation campaigns.

The study shows the limitations proper to cognitive approach studies that emphasize cognitive elements while the levels of group analysis and participative processes are not considered, thereby limiting organized, committed community participation in the solution of the dengue problem. This begs the following questions: What are the preventive measures that inhabitants identify and perform to prevent the existence of dengue? What are the community proposals to confront the dengue problem? These and other questions could be answered in further studies.

**Recommendation**

The above elements lead us to recommend considering cultural aspects in designing and disseminating dengue prevention campaigns. Encouraging community participation in the prevention process of this disease might be a tool for the development of preventive measures, with educational strategies favouring the gradual incorporation of the preventive social participation dimension in structuring the cultural domains of dengue.

Anti-dengue campaigns should place emphasis on participative prevention measures associated with washing clean water containers and not just cleanliness in general, as do current official programmes. Population density is a factor that the campaigns should take into account since information given in smaller towns could have more impact if it is disseminated orally in small groups as a way to trigger oversight by local inhabitants. A more intensive effort to inform about preventive measures that takes the inhabitants’ cultural concepts into account is needed in towns with higher population density as a way to seek greater consensus of knowledge about the dengue problem.

The measures should aim at a critical environmental approach that creates awareness among the inhabitants about the health dangers and damages that mosquito control activities focused exclusively on fumigation and abatement may produce.

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