Knowledge of mosquitos in relation to public and domestic control activities in the cities of Dar es Salaam and Tanga

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A study of community awareness of mosquitos and related subjects in the residential areas of two Tanzanian cities (Dar es Salaam and Tanga) showed that residents were well aware of mosquitos. Almost all claimed to use some form of domestic mosquito control product for their personal protection, and many spend a significant portion of the household income on this.

The problems of nuisance-biting and malaria transmission are usually not separated and are considered to be the result of poor environmental hygiene, for which both residents and local authorities are responsible. Although Culex mosquitos are not a primary target of the Urban Malaria Control Project (UMCP), the persistence of nuisance-biting has made residents sceptical and dissatisfied with insecticide spraying. The residents’ priorities are evidently not the same as those of the health authorities, yet mutual cooperation is essential. In order to maintain community support, campaigns aimed at malaria vectors should consider the need for additional measures to control Culex mosquitos, such as those now being tried by the UMCP.

Mosquito breeding sites are non-specifically associated with rubbish and standing water of all kinds, and so the actions that the community considers necessary for mosquito source reduction tend to be poorly targeted. Residents do not recognize that some sources produce malaria mosquitos while others produce nuisance mosquitos. The environmental anti-mosquito measures currently promoted by health education and other forms of propaganda are also poorly targeted. While some of them are directed at important Culex breeding sites, others are aimed at sites of little importance for mosquitos of any kind. Almost no attention is paid to the most productive breeding sites for Anopheles malaria vectors.

Introduction

Most organized mosquito control strategies require public support of one kind or another, and the extent of people’s cooperation can determine the success or failure of the entire campaign (1). To be successful and sustainable, therefore, an intervention has to meet the expectations of both the public health planners and the local people.

Community reactions to vector control are greatly influenced by the perceived impact of interventions on insect pests and nuisance-biting (2, 3). In rural areas of Africa, Anopheles mosquitos are responsible not only for the transmission of malaria and filariasis, but also for most of the nuisance-biting at night. There is therefore no practical need to distinguish between the problems of nuisance-biting and disease transmission. In urban areas, on the other hand, anophelines are relatively rare. This is because they breed in unpolluted breeding sites—sunlit puddles, pools and ricefields in the case of Anopheles gambiae s.l., and swamps in the case of A. funestus. In towns, of course, most such places are either built over or polluted, and organic pollution favours another mosquito, Culex quinquefasciatus, which can transmit filariasis but not malaria parasites. This species breeds abundantly in pit latrines, soakage pits, and in drains blocked by rubbish (4). Several studies indicate that it greatly outnumbers malaria vectors, often by more than 100 to 1 in African towns and cities (5, 9).

Malaria is none the less an important public health problem, even in towns, firstly because A. gambiae is such an efficient vector, and secondly because urban residents, being less exposed, tend to be less immune than their rural counterparts (10–13).
In Dar es Salaam, for example, malaria reportedly accounts for 13% of outpatient attendances, nearly 10% of admissions, and over 5% of hospital deaths. The contrast between the mosquitos of urban and rural areas turns out to be a mixed blessing for urban health planners. On the one hand, *Anopheles* breeding sites in urban areas tend to be fewer, easier to identify and more accessible than those in the countryside, and well-targeted attacks can therefore achieve a worthwhile degree of control; this would be unthinkable in most rural areas, where breeding sites are numerous, shifting, and scattered all over the countryside. The good news for town dwellers, therefore, is that malaria is potentially more manageable by environmental control measures in towns than in the country. The bad news is that actions directed against urban malaria vectors will usually have little effect on nuisance-biting, which in towns is mainly due to other mosquitos breeding in other places.

Nevertheless, malaria takes precedence over all other mosquito-related problems, from the point of view of public health authorities (14). Do residents share this sense of priority? This question was recently addressed by an Urban Malaria Control Project (UMCP), which has been carrying out chemical larviciding and residual house-spraying against malaria vector mosquitos in the cities of Dar es Salaam and Tanga in the United Republic of Tanzania. By 1990, there were already signs in the press and elsewhere that public support for mosquito control efforts was waning. Project staff noted that "people are becoming reluctant and uncooperative in the question of self-help, leading to minimal community participation in vector control, e.g., clearing drains, taking out their goods during residual house spraying, etc." (unpublished report of the UMCP, 1990). One suggested explanation for this lack of support was that residents had seen no reduction in nuisance-biting.

We therefore undertook a qualitative study of the knowledge, attitudes and practice of residents towards mosquitos and mosquito control measures. Our methods and findings are described in this article.

**Methods**

**Study areas**

Dar es Salaam and Tanga are both located on the Tanzanian coast. Dar es Salaam is the largest urban centre in the country, with a population of about 1.9 million; Tanga has a population of about 250 000 (15). The study was carried out in four areas of Dar es Salaam (Ilala Shauri Moyo, Temekte Wailes, Magomeni, and Mikochoeni 'A') and three areas of Tanga (Kiromoni, Amboni, and Mafuriko) in August and September 1991. The study areas in Dar es Salaam were neither in the very centre nor at the edge of the city, and are typical of urban residential areas of many Tanzanian towns and cities. The study areas in Tanga were more peripheral and less urbanized than those in Dar es Salaam.

In both cities, malaria is the most important mosquito-borne disease and a public health problem of primary importance. Entomological sampling (UMCP, unpublished data) indicates that, as expected, malaria transmission is more intense in the semi-rural study areas in Tanga than in the more central areas studied in Dar es Salaam. Filariasis, which in urban areas is transmitted mainly by *C. quinquefasciatus*, is a problem of secondary importance in both cities, the more serious manifestations of elephantiasis being confined mainly to older people. Yellow fever has not been reported for many years in either Dar es Salaam or Tanga.

Since 1988, with financial support from the Japanese government, the Dar es Salaam and Tanga UMCP has been conducting a malaria vector control campaign, using the conventional approach of chemical larviciding in central areas, and house-spraying in semi-rural peripheral areas. The insecticide fenitrothion has been used for both purposes. The larviciding has been directed primarily against the breeding sites of *Anopheles* but also, in some places, against *C. quinquefasciatus*. However, *C. quinquefasciatus* populations in both cities are known to be highly resistant to a wide range of organophosphates including fenitrothion (16, 17). Entomological sampling has confirmed that *C. quinquefasciatus* densities remain high.

**Interview methods**

Methods were selected because they were non-intrusive to householders, and simple and quick for existing staff to perform and analyse. Direct interviews with residents were conducted in the Swahili language using focus group discussion techniques (e.g. 18). Two kinds of discussion took place. First, discussions were conducted in pre-arranged and sometimes rather formal meetings with community leaders, party officials and *balozis* (i.e., the political representatives of groups of about ten households). There were five such discussions in Dar es Salaam and three in Tanga, with a combined total of 94 community leaders. Second, in-depth focused dis-

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cussions were conducted informally with individuals and small groups of residents encountered on the street, in shops, and at home. These concentrated on groups that were poorly represented in the meetings with community leaders, i.e., on women, the young and the old; 28 such conversations took place in Dar es Salaam, and 44 in Tanga, with totals of 80 and 95 residents, respectively.

The interviewing team carried field guides giving key prompts to direct interviews, but notes were taken after the meetings rather than at the time. Each interviewer independently wrote case notes on a pre-structured form, including key words and phrases used by interviewees on each topic, and details on the mood and surroundings of the interview. Up to three independent reports were produced for each interview or meeting.

Results
The interview notes were analysed for comments relevant to the following topics: knowledge of mosquitos and mosquito-borne disease, understanding of breeding sites of mosquitos, attitudes to the control measures carried out by the UMCP, and domestic methods of mosquito control.

Knowledge of mosquitos
All residents interviewed were aware of mosquitos, which were often present and attempting to bite when interviews were conducted in the evening. Mosquitos were distinguished by their biting habit and the noise made by flying adults. The existence of more than one kind of mosquito was recognized by only a minority of respondents; in each case, biting was stressed as a feature of all mosquitos. The name “Anopheles” was mentioned more frequently than “Culex”, but no one commented on which kind was more common. Variations in the size and colour of mosquitos were sometimes noted, but it was clear that for most people “a mosquito is a mosquito”. Typical comments included:

— “Different types? I haven’t really looked. But now you come to mention it, there is a small black one now. Small and weak-looking and black: I haven’t seen that one before” (old man, Magomeni);
— “Some are big and make noise, others are small and cause itching when they bite” (young man, Kiomoni);
— “All are alike” (young man, Mafuriko).

Knowledge of mosquito-borne disease
Most respondents made an explicit connection between mosquitos and malaria. Malaria is seen as an important health problem for the community. Fever, and less frequently anaemia, were mentioned as symptoms. A number of respondents, particularly mothers and community elders, noted that malaria is a particular danger for young children, and protecting them was seen as an important reason for using nets and insecticides.

— “They cause malaria... (so) I bought the net for the new baby when he was only three months old” (young woman, Magomeni);
— “I’ve got a net for the baby... otherwise he’ll get fever” (young woman, Ilala);
— “Children — they’re the ones who get fever if they’re bitten” (old man, Magomeni).

In Tanga, a greater proportion of respondents reported recent episodes of malaria in themselves or members of their family:

— “They cause fever and weakness. Even today I have taken chloroquine tablets because I have fever” (middle-aged man, Kiomoni);
— “My child got a blood transfusion because of malaria which led to a lack of blood” (young lady, Kiomoni);
— “Many of our children have died because of malaria” (old lady, Kiomoni).

Filariasis and hydrocele were mentioned rather more frequently in Tanga than in Dar es Salaam, but in both places much less than malaria. Yellow fever was mentioned by only two respondents.

The link with disease appeared to be with human-biting mosquitos generally. Only three respondents out of 80 in Dar es Salaam named Anopheles as the vector for malaria; while in Tanga, one resident stated that Anopheles mosquitos carry malaria, Culex transmits filariasis, and Aedes carries yellow fever. In general, very few people associated different mosquitos with the different diseases they mentioned. A group of balozis in Mafuriko reported that “mosquitos cause malaria, filariasis and hydrocele”, “they also cause yellow fever”, and “they are a nuisance too”.

The nuisance role of the mosquito was repeatedly emphasized, and all residents cited this as a key reason for spending money on protection against mosquito bites. From the range of graphic comments made by residents, three main portraits of the mosquito emerged, the first two being mentioned more frequently:

(1) Mosquitos as disease agents: “they bring disease, malaria...”; “when they bite, you get fever and have to go to bed...”; “we have no choice but to protect ourselves from mosquitos”; “malaria is killing us”.
(2) Mosquitos as irritants: “at night you can’t sleep”; “their bites cause rashes and itching...”; “they keep you awake all night...”; “some people use booze so as not to feel the bites...”; “sometimes you can’t sleep for the noise of people in houses around trying to kill mosquitos...”; “they itch so you can’t sleep”.

(3) Mosquitos as debilitators: “they suck your blood...”; “they inject you with toxins...”; “they eat people’s blood...”; “they reduce your blood supply”.

**Breeding sites**

Most people said that mosquitos breed in one or more types of water, especially “standing water” and “dirty water”. Latrines, cess pits, drains, ditches, ponds and swamps were often specifically identified, and tins and coconut shells were also mentioned. Some respondents cited sources not specifically related to water, although it was sometimes unclear whether these were thought of as breeding sites or as hiding places of mosquitos. In Tanga, these non-water-related sites were mostly vegetation such as banana trees, bushes, grass, and overgrown areas, while in Dar es Salaam, they were mainly associated with dirt and rubbish inside and outside houses. None of the interviewees, even those who named different mosquito species, distinguished the breeding sites of different kinds of mosquito.

Mosquitos are apparently regarded as one symptom of wider environmental deterioration, and when these concerns emerged, the subject of mosquitos tended to be subsumed in broader discussions of dirt and rubbish, drainage and sanitation, and council services in general.

**Attitudes to organized mosquito control activities**

Respondents judged the success of UMCP control activities in terms of the impact on mosquitos as a whole; no one distinguished between efforts to control malaria vectors and those aimed at *Culex* mosquitos. Although some people recognized that mosquito control is not an easy task, favourable comments were greatly outnumbered by complaints. The most fundamental complaints, particularly in Dar es Salaam, related to the scope and focus of current control strategies. Many older respondents reminisced about broader municipal services and mosquito control measures in the past, which they said had been more effective:

— “In the old days drains, puddles, pits and rubbish were cleared up and inspectors came; now all this has died and they just come to spray every two or three months... spraying those chemicals in breeding sites is good, but it’s not a permanent solution... health officers never come here anymore, and health regulations are not enforced... people neglect their surroundings and let breeding sites come up... it’s just not like the old days” (group of *balozis*, Ilala);

— “There used to be tin collectors, mosquito-finders going from house to house, people who cut and cleaned drains, people who sprayed chemicals in the water, and even spraying from the air” (*baloz*, Magomeni);

— “Environmental sanitation is good, like weeding round our houses, cutting down sugar cane, banana trees and long grass” (young woman, Amboni).

In Dar es Salaam, some people reported having joined in community-based source-reduction activities, clearing drains of silt and rubbish by hand. These activities were instigated by the UMCP and local authorities, and participation in them was reported with pride. However, there were several complaints that the Council had repeatedly broken its promise to send a lorry to take away the debris they had dug out so that, with the next heavy rain, it all washed back into the drain.

Many residents in Dar es Salaam complained about the spray teams responsible for weekly larviciding, particularly the long and irregular intervals between their visits:

— “What activities? Oh, yes—those people with pumps on their backs like babies. They did come and spray the place, but later I only saw them walking along the street... I don’t know where they were going” (female secretary, Ilala);

— “Nowadays the mosquito people don’t go into the small streets, they come once and don’t come back... not like the old days” (*baloz*, Ilala).

In Dar es Salaam, the consensus was that mosquito densities declined for only a few days following larviciding activities, and a few people specifically cited resistance as a reason for this.

— “Some workers came and put chemicals in our latrines and along the drains. Yes, the mosquitos did decrease... for two or three days” (young man, Mikocheni);

— “They used to use a better spray. DDT?—yes, I read that it wasn’t used anymore, but it worked better, it used to kill mosquitos properly” (old man, Magomeni);

— “The blocked drain is our worst problem. The chemicals used to work but they’re not good anymore—they don’t work” (*Baloz*, Temekte).

Similarly in Tanga, where the study areas received house-spraying at intervals of several months, several
respondents stated that this treatment had worked well on the first occasion, but that subsequent spray-rounds had been much less effective. There were also comments on the smell of the insecticide:

— “The first spraying was very effective but what followed was like limewash, it painted our walls” (old man, Mafuriko);

— “Spraying in houses is useless as it does not bring any relief, the first phase was OK, perhaps nowadays they put too much water” (old man, Amboni);

— “The chemical you are spraying is useless, it just makes mosquitos more aggressive, it does not kill them. We are fed up with this job of removing our household items, washing the floor and putting back the furniture. That is why some people keep their doors closed. The chemical stinks” (young women, Amboni).

It may be noted that this last comment echoes the objections to house spraying often voiced in malaria control programmes (19).

The only control activity to gain as many favourable as unfavourable comments was insecticide fogging carried out in some parts of Dar es Salaam:

— “When the machine works by fogging, there are no mosquitos for up to a week” (young man, Ilala).

**Personal protection against mosquitos**

Almost everyone claimed to be using domestic mosquito control products of some sort. The degree to which different individuals used such products apparently depended mainly on their perceptions of nuisance-biting. However, an explicit link with protection from malaria was made frequently, particularly with reference to mosquito nets for protecting children. Cost was by far the most frequently reported constraint. In Dar es Salaam, the four respondents who reported not using mosquito control in their homes were elderly, and three cited shortage of money as the reason. The fourth said that protection from mosquitos was important for children but not for old people. As factors influencing choice, respondents cited a variety of factors including cost, effectiveness, practicality, and the side-effects associated with some methods.

The most frequently cited method was the burning of repellents—almost entirely mosquito coils in Dar es Salaam, and both coils and local herbs of the genus *Ocimum* in Tanga. Coils were seen as being only partially effective, but better than nothing. It was noted that a coil can protect the whole room, but also that it does not last the whole night. There was strong criticism of the perceived respiratory side-effects of burned repellents, especially coils, and for some people these side-effects outweighed the benefits.

— “We normally burn kivumbasi [*Ocimum* spp.] and sometimes coils, but coils are expensive” (old man, Kiomoni);

— “I use coils but they are not effective and cause cough and flu” (old man, Mafuriko);

— “I don’t like mosquito coils: they’re not very good, and the smoke intoxicates me and makes me heavy and sleep too much, giving mosquitos more time to suck my blood freely” (young man, Temekte).

Most coil users in Dar es Salaam claimed to use a coil every night, and although this was probably an exaggeration in some cases, it implies a monthly expenditure of about 360 shillings (approximately US$ 1.00). This can be compared with the monthly rent for one room, as reported by residents of Mikocheni and Magomeni, which varied around 750 shillings.

Nets were generally recognized as being the most effective method of personal protection, and especially important for the protection of babies. In Dar es Salaam, three out of five women who had very young babies had bought nets with the specific intention of protecting their infants from mosquito bites. Some respondents noted that nets need to be tucked in properly, that they do not protect you before going to bed, and that mosquitos can still bite if the occupants sleep with an arm or leg touching the net. A few commented that it was very hot to sleep under a net. However, the main constraint on the use of nets was clearly the cost (2500–4000 shillings, US$ 7–11). Several people remarked that nets get holes quickly and so do not last long, in relation to the cost. However, even assuming that a net lasts only for one year, this amounts to a monthly expenditure of about 265 shillings (US$ 0.75), less than the cost of using one coil a night. The usual comment on this, often made spontaneously, was that coils are more affordable in practice because they can be bought one by one, whereas a net requires a large initial outlay.

— “Nets are best—you don’t need education to know that. You just lie there and it doesn’t matter if the house is full of mosquitos. But if you earn only three or four thousand shillings a month, and a net is two thousand, what do you eat?” (*balodzi*, Ilala);

— “Nets are best—but if you don’t have the where-withal, you have to try and buy bit by bit” (young woman, Magomeni);

— “Nets are good because you sleep nicely but they are very expensive and I cannot afford one” (old woman, Amboni);
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— "I do not use coils because they have very serious side-effects on me. Instead I am using a net which I bought in 1985" (old man, Amboni).

Some respondents in Dar es Salaam reported using a knockdown spray, consisting either of a liquid insecticide sprayed with a hand pump or an aerosol can, which was used in the evening before going to bed. Sprays were appreciated for their immediate effectiveness, but were criticized for their cost and lack of sustained benefit. If a can lasts one week with nightly use, the monthly cost would be about US$ 3.30 — much more than a net or coils.

A few people said they used nothing but a fan. Fans were said to cause colds, and to be good only in the immediate vicinity of the fan; they were regarded as being too expensive for most people (10 000 to 15 000 shillings, US$ 28–42). Very few respondents favoured window gauze which, being expensive and effective only in combination with other efforts to seal the house, was said to be something for rich people only. These methods were not reported in the more rural areas in Tanga, although several people mentioned that they would use them if they could afford it.

Discussion

The residents of Dar es Salaam and Tanga regard mosquitos as a nuisance, as debilitators, and as disease vectors. They place a high priority on domestic control, almost everyone claiming to make use of one or more of the available products. Cost was the most important constraint on choice and degree of use. Even allowing for some exaggeration, it appears that a considerable portion of household income is spent on this. However, price was not the only consideration; the relative efficacy of different products was also taken into account, as were questions of durability and both positive and negative side-effects.

While coils were described by many as being less satisfactory but more affordable, nets were consistently the most desirable option, a view that should be taken into account by those involved in large-scale operations using pyrethroid-treated nets. Indeed, on several occasions, people wondered when the UMCP would introduce treated nets into its programme — as it has done now...

The residents' understanding of the role of mosquitos as disease vectors was high. Nevertheless, with the exception of some mothers who used nets to protect their babies specifically against malaria, most people appeared to use domestic control products as protection first against nuisance-biting and secondarily against malaria. Both this and the high level of spending on protection are consistent with the results of studies in other African cities (20–24). While the answers to questions about mosquitos sometimes mentioned malaria, and vice versa, filariasis was mentioned by fewer people, and yellow fever only rarely. This reflects the relative importance of these diseases in terms of public health.

A significant minority knew the name "Anophelles", and some the name "Culex"; but for most people "mosquitos are mosquitos"; and while they may vary in appearance, different kinds of mosquitos were not linked to different diseases or to different control measures. This kind of distinction is unnecessary for the use of domestic control products, most of which are more or less equally effective against the two main mosquito problems of Dar es Salaam and Tanga: the nuisance-biting C. quinquefasciatus and the less numerous but more dangerous A. gambiae.

Discrimination between mosquito types is important, however, when it comes to control measures that affect one of these problems but not the other. This includes the efforts of the UMCP, which have been directed almost entirely against malaria vectors, but employing an insecticide to which the main nuisance-biting mosquito is resistant. As originally suspected, residents' critical attitudes towards UMCP activities stem largely from the lack of any noticeable reduction in nuisance-biting. This confirms that public support for urban mosquito control schemes is likely to depend on a reduction in nuisance-biting, and sometimes additional measures may be necessary specifically to ensure this.

Many residents contrasted current control efforts with those recalled from "the good old days". They said that local health officers in the past used to visit regularly to enforce measures of environmental sanitation, which seem to have been aimed more at general hygiene than at mosquitos. This accords with the community's perception of mosquito breeding sites. Most people have a sketchy knowledge of mosquito breeding sites, being able to identify some categories but not others, and often naming sites that are unimportant. Moreover, there is no recognition that mosquitos causing different problems come from different places. This generalized view appears to be shared by almost everyone, including teachers, politicians, health educators and expatriates.

Tanzanians are frequently exhorted by health education messages of all kinds to clear up their environment for the sake of malaria control. Unfortunately, the specific actions recommended by such campaigns, while they may have other benefits, are unlikely to have this effect. For example, the cutting down of vegetation around houses — particularly maize and bananas — is widely believed to be a simple and moderately effective form of malaria mos-
quito control (25), although there seems to be no evidence to support this suggestion (26), and at least some evidence against it (27). The most common suggestion, and the one that most often leads to positive action, is the clearance of silt and rubbish from polluted drains, which are major breeding sites for Culex but not Anopheles mosquitoes. Swamps are often cited as another target to be tackled with community participation, but in fact the swamps themselves are relatively harmless, as long as they remain covered in tall reeds. Often no mention is made of ricefields and cultivation ridges, which are almost certainly the most productive Anopheles breeding sites by far. The fact that such information is not available to the residents of Dar es Salaam potentially hampers effective action for mosquito control.

People are concerned about mosquitoes and would control them if they could. Public sources of information tend to reinforce prevailing views on mosquitoes and where they come from. Consequently, community-based efforts for mosquito control are mostly aimed at Culex breeding sites, which are the most conspicuous, and rarely at the less obvious Anopheles sites, which are the usually stated target. It might be argued that a more specific message would be too complicated, and that people are just as concerned about nuisance-biting as they are about malaria. However, while C. quinquefasciatus and A. gambiae s.l. larvae are sometimes found together in African cities, their most productive breeding sites are actually quite separate. In order to target source reduction measures effectively, some difficult choices have to be made—for example, whether to concentrate on the nuisance-biting Culex or the malaria vector Anopheles; and if the latter, whether to forego crops of rice, yam and sweet potato for the sake of malaria control.

These decisions, if they are to gain the community’s support and participation, must be made through some kind of social consensus. By-laws governing urban cultivation, for example, will remain unenforceable unless they are backed up socially in this way. This cannot happen without more information. More specific awareness, among residents and community leaders, of which mosquito problems come from which sites must be promoted. This may not be complicated: a three-way distinction between small containers, foul water, and unpolluted puddles and streams would be enough. This would help both local communities and public health authorities to act according to their own environmental priorities.

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Résumé
La connaissance des moustiques et ses rapports avec les activités générales et domestiques de lutte à Dar es-Salaam et à Tanga
Une étude portant sur la connaissance des moustiques et autres questions en relation avec les moustiques a été réalisée dans divers quartiers d’habitation de deux villes de Tanzanie, Dar es-Salaam et Tanga. Des discussions en groupe ont été menées avec les notables locaux et avec des habitants et ont porté sur les moustiques, les maladies qu’ils transmettent et les méthodes de lutte.

Les résidents ont une bonne connaissance des moustiques; le paludisme et, dans une moindre mesure, la filariose sont reconnus comme maladies transmises par les moustiques, et sont davantage mentionnés dans les zones périurbaines de Tanga que dans les quartiers urbains de Dar es-Salaam. La quasi-totalité des personnes interrogées utilisent un produit de lutte contre les moustiques et nombre d’entre elles déclarent y consacrer une part notable de leur revenu. La plupart des habitants, à l’exception des mères de très jeunes enfants, mentionnent comme raison de l’utilisation de tels produits la protection contre la gêne occasionnée par les piqûres plutôt que contre le paludisme.

Toutefois, le lien perçu entre les moustiques et le paludisme est très net, comme le montrent les réponses aux deux types de questions. Les moustiques et le paludisme sont tous deux perçus comme la conséquence d’une mauvaise hygiène de l’environnement, dont sont responsables à la fois les habitants et les autorités locales. Bien que les moustiques du genre Culex ne fassent pas partie des cibles principales du Projet de lutte contre le paludisme urbain, la persistance de moustiques nuisants provoque le scepticisme et le mécontentement des habitants vis-à-vis des pulvérisations d’insecticides dans le cadre de ce projet.
Les sites de reproduction des moustiques sont associés de façon non spécifique aux détritus et aux eaux stagnantes de tous types, et les mesures jugées nécessaires pour réduire les gîtes de moustiques tendent à être mal ciblées. Il n'est pas reconnu que certains gîtes produisent des moustiques vecteurs du paludisme et d'autres des moustiques nuisants. Les mesures de lutte contre les moustiques fondées sur la gestion de l'environnement, actuellement prônées par l'éducation sanitaire et par d'autres campagnes d'information, sont également mal ciblées. Certaines sont dirigées contre d'importants sites de reproduction de Culex tandis que d'autres visent des sites de peu d'intérêt. Les sites de reproduction les plus importants pour les anophèles vecteurs du paludisme ne sont presque jamais mentionnés.

References
