Introducing Insecticide Treated Mosquito Nets in the Kilombero Valley (Tanzania): Social and Cultural Dimensions

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Summary

Malaria remains one of the most important causes of suffering, death and poverty. The provision of prompt diagnosis and treatment should be a key component of any malaria control programme, but in reality disease management is often not adequate due to weaknesses in the health systems. Especially in areas, where access to health services and proper medication is limited and where parasites have become resistant to anti-malarial drugs, insecticide-treated nets (ITNs) present an attractive option to complement the other tools in malaria control. Under trial conditions, ITNs have been shown to have an impact in reducing clinical malaria episodes and related mortality.

A large-scale social marketing programme has implemented ITNs to reduce child mortality in an area of intense, perennial malaria transmission in southern Tanzania. The present study formed part of this programme. It examined social and cultural aspects of the distribution, delivery, acquisition and use ofITNs, paying particular attention to local knowledge and practice, interactions between project staff and villagers and to household dynamics. The main goal of this qualitative research was to contribute to the improvement of the intervention process within the framework of the Kilombero Treated Net Project.

Fieldwork was carried out in two stages: 1) formative research and 2) ethnographic monitoring. Formative research began with a community study in 18 villages from July to August 1996. More contextualized information on local knowledge and practices about malaria, treatment and prevention was collected during a short ethnographic study in two villages between September and December 1996. Based on the findings from the community study and the focused ethnographic assessment, a questionnaire was developed for a survey in four villages. The second stage, ethnographic monitoring, was designed to capture the interactions and social processes surrounding

the project implementation in one particular locality over a period of time.

An important finding of this study is that people have integrated ideas derived from biomedical knowledge into their interpretation of malaria. Villagers commonly use the term *maleria* but only to refer to a mild and easily cured type of fever which they see as caused by mosquitoes. Swahili terms such as *degedege* (convulsions), *bandama* (enlarged spleen) and *homa kali* (high fever), on the other hand, are used for conditions that are commonly feared as life threatening, especially for small children, and - from the biomedical perspective - related to the complicated forms of clinical malaria.

The local interpretations of malaria and related illnesses are closely linked to the logic of actions taken in specific situations, for instance, since severe forms of malaria are linked to "supernatural" causes, identified as attacks of witches and bad spirits, an amulet*(hirizi)* from a traditional healer is thought more desirable than an ITN for protecting *(kinga)* a vulnerable child. In this context, the promotion of ITNs as an effective preventive tool may not make much sense from the villager's point of view.

The findings further show that the local understanding of malaria transmission in the study area acknowledges the mosquito-malaria link. Moreover, most villagers (52%) already had untreated nets and insecticide net treatment was not a new idea in the study area. Although the majority of villagers (76%) are aware of the role of mosquitoes in malaria transmission, they seriously doubt the link between severe malaria and mosquitoes. An often heard argument was: If mosquitoes caused severe *maleria*, everyone would be dead by now. Why would vulnerable young children who live in the village and get bitten by mosquitoes continue to survive? And why would

malaria attack people who sleep under nets in a similar way as those who do not?

These findings clearly show that researchers should not conceptualise people's knowledge about malaria and its prevention as something that is there, that belongs to a cultural tradition and remains the same over time, in other words, as something static. The knowledge which informs villagers' practices relating to malaria is a result of the interaction of diverse strands of knowledge from different sources. Moreover, people's questions and arguments demonstrate that they do not just *have* but that they do *seek* knowledge.

On a more theoretical level, knowledge can be seen as a result of interpretive practices. Such an understanding of knowledge has great potential for the planning and implementation of interventions. This study drew attention to the interface between locally available knowledge and the knowledge brought into the area by the project. Drawing on a typology developed in research on cultural dimensions of development (Mundy and Compton 1995), the study examined processes of social interaction and communication through which knowledge was constructed, negotiated and reinterpreted. The data clearly showed that, in addition to a promotional campaign at the beginning of a project, a continuous dialogue between the project and the villagers is needed to enhance the sustainable delivery, distribution and use of ITNs over time.

In the last analysis, an ITN intervention can only be sustainable, if people implement it at the household level. Therefore, an investigation into social and cultural aspects of effectiveness includes an examination of social interactions within and across households. Households play an important role in day-to-day health production. More precisely, it is not the household but different members of a household who produce health; what each of them contributes is, to a

large extent, defined by gender. Headship is often used as a proxy for gender relations. This study shows that headship is a meaningful analytical category, it should not be assumed but investigated in particular settings. Moreover, the study argues that headship is closely associated with the acquisition, ownership and use ofITNs. According to the dominant gender model in the study area, the husband provides household necessities, and the wife depends on his good will and economic ability. If women live by themselves or with children and head a household, their own skills to generate income determines their acquisition, ownership and use ofITNs.

This study demonstrates that a dynamic view of malaria related knowledge and practice opens innovative lines of inquiry which may contribute to enhancing the effectiveness of ITN interventions.

Zusammenfassung

Malaria ist und bleibt einer der wichtigsten Gründe für Leiden, Tod und Armut. Prompte Diagnose und Behandlung sollten eine Schlüsselkomponente jedes Programms zur Malariabekämpfung sein, aber in der Realität wird Krankheit oft nicht optimal gemeistert wegen Schwächen im Gesundheitssystem. Vor allem in Gebieten, in denen der Zugang zu Gesundheitsdiensten und richtiger Medikamentenversorgung eingeschränkt ist und in denen Parasiten resistent gegen Anti-Malaria-Mittel geworden sind, bieten mit Insektizid behandelte Moskitonetze (insecticide treated nets, ITNs) eine attraktive Option, um die anderen Werkzeuge zur Malariabekämpfung zu ergänzen.

Ein gross angelegtes Social Marketing Programm hat die ITN-Technologie angewandt, um die Kindersterblichkeit in einem Gebiet mit intensiver, ganzjähriger Malaria-Übertragung im südlichen Tansania zu reduzieren. Die vorliegende Studie ist ein Teil dieses Programms. Sie untersucht soziale und kulturelle Aspekte der Verteilung, der Lieferung, des Kaufs und der Nutzung von ITNs, unter spezieller Berücksichtigung des lokalen Wissens und lokaler Praktiken, der Interaktionen zwischen Projektmitarbeitern und den Dorfbewohnern und der Haushaltsdynamik. Das Hauptziel dieser qualitativen Forschung ist es, einen Beitrag zur Verbesserung des Interventionsprozesses im Rahmen des Kilombero Treated Net Projektes zu leisten.

Die Feldforschung verlief in zwei Phasen: 1) einer vorbereitenden Forschung und 2) einem ethnographischen Monitoring. Die vorbereitende Forschung begann mit einer Untersuchung in 18 Dörfern von Juli bis August 1996. Mehr kontextbezogene Informationen über lokales Wissen und lokale Praktiken zu Malaria, deren Behandlung und Prävention wurden während einer kurzen ethnographischen Studie in zwei Dörfern von September bis Oktober 1996 gesammelt. Basierend auf den Ergebnissen dieser beiden Studien wurde ein Fragebogen entwickelt für eine Vergleichsstudie in vier Dörfern. Die zweite Phase, das ethnographische Monitoring, war darauf ausgerichtet, die Interaktionen und sozialen Prozesse rund um die Projektdurchführung an einem bestimmten Ort über eine längere Zeitperiode hinweg zu erfassen.

Ein wichtiges Ergebnis der gesamten Forschung ist, dass die Menschen im Untersuchungsgebiet Ideen, die vom biomedizinischen Wissen abgeleitet worden sind, in ihre Interpretation von Malaria integriert haben. Die Dorfbewohner verwenden häufig den Begriff *maleria*, aber nur um auf eine milde und leicht heilbare Fiebererkrankung hinzuweisen, die ihrer Ansicht nach durch Moskitos verursacht wird. Swahili-Begriffe wie*degedege* (Krämpfe am ganzen Körper), *bandama* (vergrösserte Milz) und *homa kali* (hohes Fieber), auf der anderen Seite, werden für Krankheitszustände benutzt, die gewöhnlich als lebensbedrohend gefürchtet werden, vor allem bei Kleinkindern, und - aus der biomedizinischen Perspektive - mit klinischer Malaria zu tun haben.

Die lokale Interpretation von Malaria und verwandten Krankheiten ist eng verbunden mit der Logik von Handlungen in spezifischen Situationen, zum Beispiel der bevorzugten Prävention von schwerer Malaria. Da diese Kategorie von Krankheit durch "übernatürliche" Ursachen, nämlich Angriffen von Hexen und bösen Geisern, erklärt wird, wird ein Amulett von einem Heiler als wünschbarer eingestuft zum Schutz *(kinga)* eines verletzlichen Kindes als ein ITN. In diesem Kontext macht wohl die Promotion von ITNs als effektives Präventionsmittel wenig Sinn aus der Sicht der Dorfbevölkerung.

Die Ergebnisse zeigen ferner, dass das lokale Verständnis der Malaria-Übertragung im Untersuchungsgebiet die Verbindung Mücke-Malaria durchaus anerkennt. Die meisten Dorfbewohner (52 Prozent) hatten bereits (unbehandelte) Moskitonetze und die Imprägnierung von Netzen mit Insektizid war nicht eine neue Idee im Untersuchungsgebiet. Obwohl die Mehrheit der Dorfbevölkerung (76 Prozent) die Rolle der Moskitos in der Übertragung von Malaria kannten, zogen sie die Verbindung zwischen schwerer Malaria und Mücken ernsthaft in Zweifel. Ein oft gehörtes Argument war: Wenn Moskitos schwere Malaria verursachten, wäre heute jedermann tot. Warum überleben immer noch verletzliche Kleinkinder, die auf dem Dorf leben und von Moskitos gebissen werden? Und warum greift Malaria Leute, die unter einem Moskitonetz schlafen, auf eine ähnliche Art an wie jene, die das nicht tun?

Die Untersuchungsergebnisse zeigen deutlich, dass Forscher das Wissen der Menschen über Malaria und deren Prävention sich nicht als etwas vorstellen sollten, das dort ist, das zu einer kulturellen Tradition gehört und über die Zeit hinweg gleich bleibt, mit andern Worten, als etwas statisches. Das Wissen, das die Praktiken der Dorfbewohner im Umgang mit Malaria anleitet, ist ein Resultat aus der Interaktion von verschiedenen Wissenssträngen aus verschiedenen Quellen. Zudem zeigen die Fragen und Argumente der Menschen, dass sie nicht nur Wissen*haben*, sondern Wissen *suchen*.

Auf einer mehr theoretischen Eben kann man Wissen als interpretative Praktik sehen. Ein solches Verständnis von Wissen birgt ein grosses Potential für die Planung und Umsetzung von Interventionen. Diese Untersuchung zieht die Aufmerksamkeit auf das Ineinandergreifen von lokal vorhandenem Wissen und Wissen, das vom Projekt in das Untersuchungsgebiet gebracht wurde. Sie bezieht sich auf eine Typologie (Mundy und Compton 1995), die aus der Erforschung von kulturellen Dimensionen der Entwicklung hervorgegangen ist, und untersucht die Prozesse von sozialer Interaktion und Kommunikation durch die Wissen konstruiert, verhandelt und re-interpretiert wird. Diese Daten zeigen deutlich, dass, zusätzlich zu Promotionskampagnen zu Beginn eines Projektes, ein fortwährender Dialog zwischen dem Projekt und den Dorfbewohnern nötig ist, um eine nachhaltige Lieferung, Verteilung und Nutzung von ITNs zu fördern.

Letztlich kann eine ITN Intervention nur dann nachhaltig sein, wenn sie von den Menschen auf der Haushaltsebene umgesetzt wird. Deshalb schliesst eine Untersuchung der sozialen und kulturellen Aspekte von Effektivität eine genauere Prüfung von sozialen Interaktionen in und zwischen Haushalten mit ein. Haushalte spielen eine wichtige Rolle in der alltäglichen Produktion von Gesundheit. Genauer gesagt ist es nicht der Haushalt, sondern verschiedene Haushaltsmitglieder, die Gesundheit produzieren; was jeder von ihnen beiträgt ist zu einem grossen Anteil durch das Geschlecht definiert. Headship (das Vorstehen) wird oft als Hinweis auf die Geschlechterbeziehung genommen. Diese Studie zeigt, dass Headship durchaus eine bedeutungsvolle analytische Kategorie sein kann, wenn sie nicht

vorweggenommen, sondern vor Ort untersucht wird. Zudem argumentiert sie, dass Headship eng mit dem Kauf, Besitz und der Nutzung von ITNs verbunden ist. Gemäss dem vorherrschenden Geschlechtermodell im Untersuchungsgebiet, versorgt der Ehemann den Haushalt mit den Notwendigkeiten, und die Ehefrau hängt von seinem guten Willen und seiner ökonomischen Fähigkeit ab. Wenn Frauen allein oder mit Kindern leben und selbst einem Haushalt vorstehen, sind es ihre Fähigkeiten zur Beschaffung von Einkommen, die den Kauf, Besitz und die Nutzung von ITNs bestimmen.

Die Untersuchung zeigt, dass eine dynamische Sicht von Malaria bezogenem Wissen und Handeln innovative Forschungsperspektiven eröffnet, die zu Verbesserung der Effektivität von ITN Interventionen beitragen können.

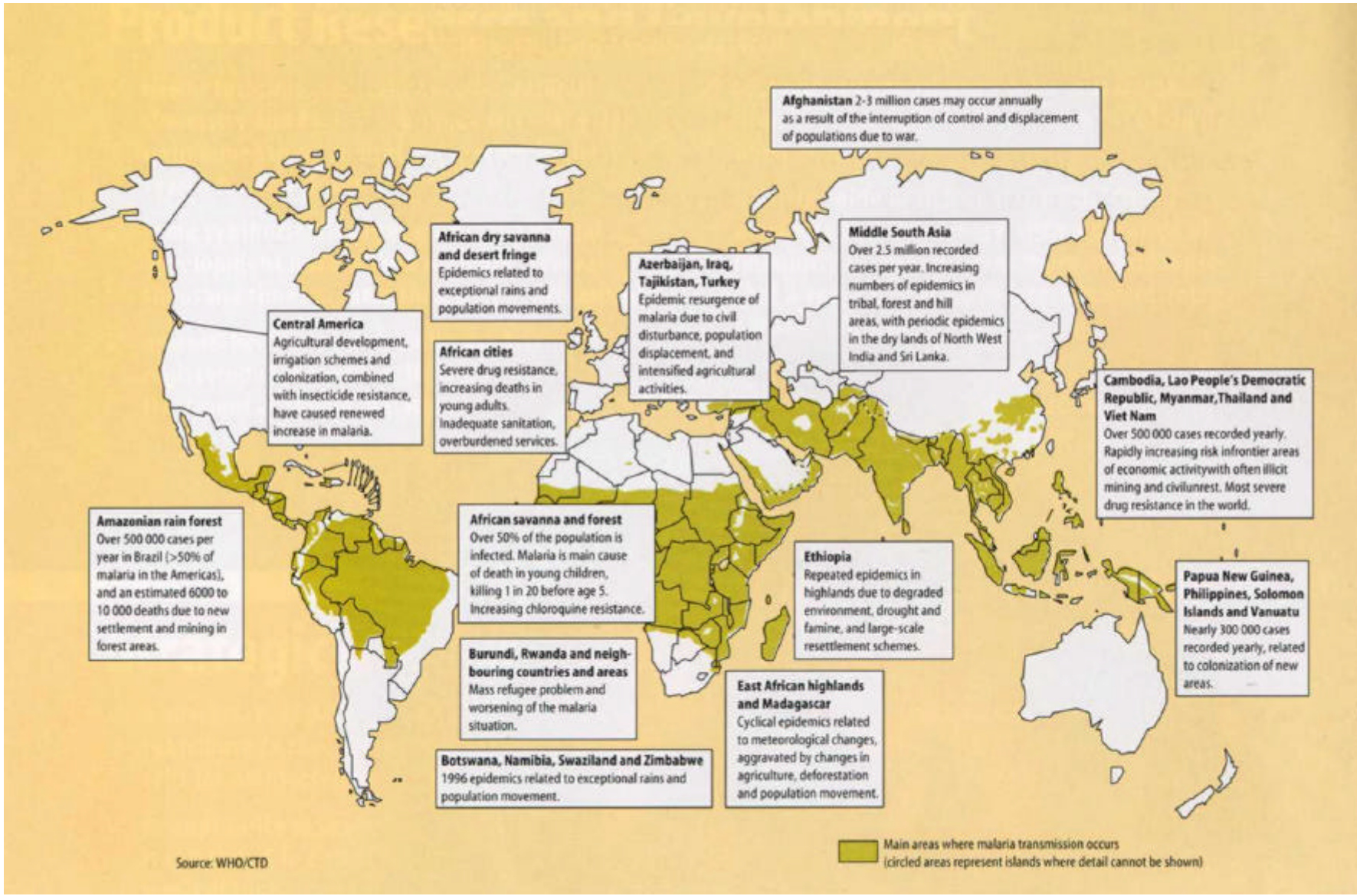
PART I INTRODUCTION

Chapter 1 International and national efforts in malaria control

1.1 The current situation

The 1999 World Health Report (WHO 1999) declared malaria to be one of the two priority issues in international health: the second was smoking. In the same year, WHO launched a global programme to Roll Back Malaria. This programme is developing a new, sector-wide partnership to combat the disease at global, regional, country and local levels. The Roll Back Malaria initiative calls for well co-ordinated action that makes it an integral part of wider development processes (Roll Back Malaria 2000). These ideas have been taken up, for instance, by the Multilateral Initiative on Malaria (1999), an alliance of organisations and individuals aiming at maximising the impact of scientific research on malaria in Africa, by promoting intensified, co-ordinated international research activities.

This concerted effort reflects the fact that malaria remains the most significant public health problem in more than 90 countries and affects 40 percent of the world's population (see Fig. 1). The global incidence of the disease is enormous, with an estimated 300 million clinical cases each year of which more than one million die. More than 90 percent of these deaths occur in sub-Saharan Africa where young children are the most affected. Malaria directly accounts for one in five childhood deaths in Africa and contributes indirectly to illness and death from respiratory infections, diarrhoeal disease and malnutrition (WHO 1999:49). The World Bank and the World Health Organisation rank malaria as the leading cause of lost Disability-Adjusted Life Years (DALYs) in Africa (World Bank 1993) with an annual loss of 35 million future life-years due to disability and premature mortality.


Afghanistan 2-3 million cases may occur annually as a result of the interruption of control and displacement of populations due to war.
African dry savanna and desert fringe
Epidemics related to exceptional rains and population movements.
Azerbaijan, Iraq, Tajikistan, Turkey
Epidemic resurgence of malaria due to civil disturbance, population displacement, and intensified agricultural activities.
Middle South Asia
Over 2.5 million recorded cases per year. Increasing numbers of epidemics in tribal, forest and hill areas, with periodic epidemics in the dry lands of North West India and Sri Lanka.
Central America
Agricultural development, irrigation schemes and colonization, combined with insecticide resistance, have caused renewed increase in malaria.
African cities
Severe drug resistance, increasing deaths in young adults. Inadequate sanitation, overburdened services.
Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam
Over 500 000 cases recorded yearly. Rapidly increasing risk infrontier areas of economic activitywith often illicit mining and civilunrest. Most severe drug resistance in the world.
Amazonian rain forest
Over 500 000 cases per year in Brazil (>50% of malaria in the Americas), and an estimated 6000 to 10 000 deaths due to new settlement and mining in forest areas.
African savanna and forest
Over 50% of the population is infected. Malaria is main cause of death in young children, killing 1 in 20 before age 5. Increasing chloroquine resistance.
Ethiopia
Repeated epidemics in highlands due to degraded environment, drought and famine, and large-scale resettlement schemes.
Papua New Guinea, Philippines, Solomon Islands and Vanuatu
Nearly 300 000 cases recorded yearly, related to colonization of new areas.
Burundi, Rwanda and neighbouring countries and areas
Mass refugee problem and worsening of the malaria situation.
East African highlands and Madagascar
Cyclical epidemics related to meteorological changes, aggravated by changes in agriculture, deforestation and population movement.
Botswana, Namibia, Swaziland and Zimbabwe
1996 epidemics related to exceptional rains and population movement.
Source: WHO/CTD
Main areas where malaria transmission occurs
(circled areas represent islands where detail cannot be shown)

1.2 The diverse and changing nature of malaria

Malaria infection occurs when a female *Anopheles* mosquito, infected with the *Plasmodium* parasite, bites a susceptible human being. There are four species of *Plasmodium* responsible for human malaria infection, namely *P. falciparum, P. malariae, P. vivax and P. ovale.* Although *P. vivax* has the widest geographical range in many parts of the world, *P. falciparum* is the most common species throughout the tropics, and subtropics and may occur in some temperate areas (Gilles 1993:124). The species produces the most lethal malaria infections (cerebral malaria and severe malarial anaemia).

Most clinical malaria episodes manifest themselves as febrile illness associated with non-specific symptoms. There are no distinct diagnostic clinical features of malaria except regular paroxysms of fever with virtually asymptomatic intervals (Warrell 1993:35). The fever may be periodic and may be interspersed with afebrile intervals. Although malaria is usually diagnosed clinically and confirmed by the detection of parasites in a blood film from a febrile individual, the parasitological criterion does not necessarily indicate clinical malaria, asasymptomatic carriers of malaria parasites are frequent in endemic areas (Smith et al 1994). Thus Diagnosis of malaria has been described as a matter of clinical judgement rather than merely uncritical reading of a laboratory report however essential that examination may be (Gilles 1993:78).

Cerebral malaria and anaemia, the most severe and life threatening manifestations of the disease, are almost exclusively due to *P. falciparum* malaria. These complications tend to be the main reasons for hospital admission of young children in endemic areas. The intensity and distribution of severe forms of *P. falciparum* malaria vary between areas with higher and lower levels of transmission as measured by entomological inoculation rates (EIRs). The youngest children living in relatively higher malaria transmission areas (EIRs above 100 per person

per year) tend to present with severe malaria anaemia as a major clinical problem. Those children living in relatively lower malaria transmission areas (EIRs below 60 per person per year) present more with cerebral malaria (Snow et al. 1994:297).

1.3 Malaria control: past, present and future

Early malaria control efforts had been successful where large area-wide control programs were feasible. The environmental control approach using DDT and other synthetic insecticides in combination with effective chloroquine chemotherapy and active case surveillance were expected to achieve global eradication in a matter of years (WHO 1999:53). Although this goal was not achieved, several countries recorded a dramatic drop of malaria cases. The example of Sri Lanka illustrates a striking success where malaria was nearly eradicated with a drop from over one million malaria cases a year to less than twenty in 1963. Moreover in areas where the infection rate was lower - namely in many subtropical areas of southern Europe, the island settings of Mauritius and Singapore, Hong Kong, and also in parts of Malaysia - malaria was eradicated or controlled (WHO 1999:55). In the late 1960s, technical problems such as resistance of the mosquito vector to DDT and resistance of malaria parasites to commonly used drugs arose. Coupled with the scaling back of external funding and a weak public support for spraying, the necessity for an alternative strategy became evident. Although the World Health Assembly reaffirmed that complete eradication was the ultimate goal, malaria control seemed more realistic, particularly in sub-Saharan Africa where eradication strategies were never attempted.

In most highly endemic areas of sub-Saharan Africa, where the need is greatest, it turned out to be very difficult to come up with effective programmes even for malaria control. Several reasons have been advanced. The mosquito vectors which transmits malaria in these areas,

primarily members of the *Anopheles gambiae* complex, are exceedingly efficient in the transmission of the disease making large reductions in malaria–related mortality unattainable by relying singly on vector control measures (WHO 1999:50). In addition, the large-scale environmental control programs and spraying of DDT and other insecticides that have been successful elsewhere are costly and require developed organisational structures. In other words, economic, structural and technical constraints complicate malaria control. Most of the highly endemic areas do not have the human, financial, and administrative resources required to carry out control programs in the traditional "vertical" form (Lengeler et al. 1996:4).

In 1992, the WHO convened a malaria conference in Amsterdam which gave a new impetus to malaria control efforts and approved a revised Global Malaria Control Strategy (WHO 1993). The strategy enlisted four basic elements for malaria control:

- Early diagnosis and prompt treatment
- Implementation of selective, sustainable, preventive measures including vector control;
- Early detection, containment, and prevention of epidemics;
- Fostering regular assessment of affected countries' malaria situation, especially the ecological, social and economic determinants of the disease, by strengthening local capacities for basic and applied research.

Early diagnosis and prompt treatment remain the basis of current malaria morbidity and mortality control even though resistance of malaria parasites to commonly used drugs continues to increase.[1] Although

[1] There is an increasing spread of chloroquine resistant P. *falciparum* malaria especially in the countries of sub-Saharan Africa (WHO 1997:272). This is coupled with limited financial resources to buy more expensive alternative drugs. As these countries are in a deepening economic crisis and face a growing foreign dept, the scale of malaria control appears to be an increasingly complex problem.

attempts at global eradication of the disease have failed and a major breakthrough for vaccine development to successfully curb the disease has not yet been achieved, increasing efforts are being made to improve molecular techniques for immunological research that will contribute to malaria vaccine development (Tropical Disease Research 1997). In addition the search for new drugs is receiving substantial support. However, for the time being, the world has reverted to one of the oldest means of malaria prevention, namely the use of mosquito nets, now in combination with insecticide.

1.4 Insecticide-treated nets: A promising tool for malaria prevention

Ideally, an untreated net provides a complete physical barrier to mosquitoes. In practice, even intact tucked in nets offer only partial protection; mosquitoes quickly find any part of the body touching the net or inadvertently left uncovered. A net with holes is better than no net at all, but unless the holes are small, it offers very little protection. This is where insecticide-treated mosquito nets (ITNs), that is mosquito nets treated with repellent insecticides, can make a big difference.

Studies have demonstrated the efficacy of pyrethroids. They not only kill insects but inhibit feeding, and drive mosquitoes and other insects from their hiding places (Lines 1996:19). If a net has been treated with pyrethroids, mosquitoes are less likely to feed through the fabric or penetrate small gaps. Evidence from this research further showed that use of ITNs has great potential in areas where malaria is endemic. Firstly, the technology is so simple and safe that it can be organised and conducted locally by non-specialists (Lengeler et al. 1996:6). Secondly, both mosquito nets and insecticides are known in the tropics (Lines 1996:17). People have heard of using nets even in places where nets themselves are uncommon and, particularly in farming communities, insecticides in different forms of agricultural chemicals are widely used.

Thirdly, and most importantly, ITNs contribute to alleviating the burden of malaria.

The application of residual insecticide to fabrics as a means of personal protection against vector-borne diseases has a history that began during World War II, being used by the Russian, German and US armies (Lengeler et al. 1996). In the late 1970s, entomologists used synthetic pyrethroids for this purpose. The WHO convened a scientific panel in 1983 to review laboratory evidence and recommended the initiation of field trials to assess the potential of this technology for malaria control. From 1986 to 1994, a number of small-scale trials were conducted and established the safety, feasibility, acceptability, and apparent efficacy of ITNs (for an overview see Lengeler and Snow 1996). These trials provided first evidence for answering the main public health question, namely whether ITNs reduce mortality among children. The size of these trials was gradually increased over the years.

In the late 1980s, the first large-scale non-randomised controlled study was carried out in The Gambia (Alonso et al. 1991). Following two years of demographic surveillance, a protective efficacy of 63 percent against all-cause mortality among Gambian children was demonstrated. These highly promising results prompted WHO/TDR, in collaboration with other donor agencies, to launch three additional large-scale trials to measure the impact of ITNs on overall child mortality in different ecological and cultural areas of Africa, namely in Ghana, Burkina Faso and Kenya. In The Gambia, where the government had decided to incorporate ITNs into the national malaria control programme, another large-scale trial to assess effectiveness was sponsored.

The completion and publication of the results from these four trials in Ghana (Binka 1997), Burkina Faso (Habluetzel et al. 1997), Kenya (Nevill et al. 1996) and The Gambia (D'Alessandro et al. 1995) marked the starting point for a broad review of randomised controlled trials (Lengeler 1998). This review concludes that clinical trials conducted in Africa have

shown ITNs to reduce overall mortality by about a fifth. For 1000 protected children in the age group 1-59 months, under ideal trial condition with regular use of ITNs, about 6 lives can be saved per year (Lengeler 1998:18). With regards to morbidity, ITNs can potentially halve the clinical episodes of mild malaria from both P.*falciparum* and P. v*ivax* infections under most transmission conditions (Lengeler 1998:24).

Today, efficacy - defined as the impact under ideal trial conditions - of ITNs is well established, but little is known about effectiveness under real life conditions, not only with regard to epidemiological questions[2] but also to managerial and operational issues. More research is needed on cost-effectiveness, on social and economic factors affecting feasibility of routine utilisation and re-treatment of ITNs and on the sustainability of such interventions (Tropical Disease Research 1997:45). Many of these aspects have been addressed in a recent review of past experiences and current trends (Lengeler et al. 1996). One of the most pertinent questions refers to the strategy used in making mosquito nets and insecticide widely available at prices that are sustainable for both provider and user (Lines 1996, Feilden 1996).

1.5 Strategies for promoting use of ITNs

Implementation strategies for ITN programmes include the questions of distributing nets and offering net treatment services and, secondly, of sources of finance (Feilden 1996:58). For distribution and re-treatment, ITN programmes have hitherto adopted a top-down approach, even though several attempts have been made to involve the community, such as preliminary meetings at different levels to provide information about treated nets and the insecticide, the intervention objectives, and the program implementation plans. In The Gambia the mortality trial was

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[2] Much debated questions are (Lengeler 1998): What impact should ITNs have to make them a worthwhile public health intervention? Can the short term impact on over-all mortality that is measured in trials be maintained over a longer period of time? It is, however, beyond the scope of the present study to review these complex debates.

implemented through the existing Primary Health Care structure (Alonso et al. 1991). Net treatment was organised by the village health workers in each village assisted by the traditional birth attendants and the head of women's groups under the supervision of a community health nurse. A malaria control officer from the Gambian Medical and Health Department provided the overall direction. The research staff carried out the distribution of nets and the treatment of the first net in each compound for demonstration, and all recipients individually followed the procedure to dip their own nets. In Ghana net re-treatment was carried out under similar conditions every 6 months in each compound (Binka 1997:25). In Burkina Faso, the *Centre National de Lutte contre le Paludisme* provided assistance in the implementation of the trial. Field supervisors and fieldworkers demonstrated and supervised the distribution, treatment and correct use of curtains, which were used instead of mosquito nets in this trial (Habluetzel et al. 1997). In Kenya, trained field teams under the supervision of senior members of the program staff delivered the pre-treated nets and demonstrated the correct use and hanging. The Public Health Technicians concurrently ran a house to house education program on how to use and care for the nets. During the trial the team members visited each of the scattered homesteads for net re-treatment (Snow et al. 1999:19).

With regard to sources of finance, trials have been mainly sponsored by donor agencies. Efficacy trials involve "best case" situations and thus seek 100 percent coverage, through free net distribution, free insecticide treatment, and intensive interpersonal promotion (Zimicki 1996:111). This makes their approaches too costly and labour intensive for incorporation into national and local malaria control programmes (Snow et al. 1999:19).

In sub-Saharan Africa most governments increasingly face financial crises and ever deepening budgetary constraints that make it difficult to deliver basic health care for their populations let alone preventive

interventions. Moreover, donors are increasingly reluctant to finance interventions which cannot be sustained locally. Researchers and policy makers in the health sector, and malaria control in particular, have therefore been constantly searching for alternative sustainable ways of promoting ITNs with minimal external financial support. There is little knowledge and experience regarding the best strategies to motivate and inform people about the potential of using treated nets and regular re-treatment in order to achieve high coverage and compliance for better impact.

In most developing countries the formal health sector has been dominated by publicly financed, publicly provided services. Many countries have already moved or are moving from this system to one with a widening role for the private sector in the provision of services. The term 'private sector' has increasingly gained attention in different publications regarding the current efforts geared at formulation of efficient policies for financing and managing health care services. Bennett (1992:98) broadly defines the private sector as all organisations and individuals whose work falls outside the direct control of the state. The private health care sector can be divided into profit and non-profit making services although the distinction between these two categories is sometimes difficult as the operational basis for both overlaps. Profit making services include private clinics and hospitals, private practitioners, pharmacies, shops and street market traders as well as "traditional" healers. Private health provision has been characterised as an important source of care for ambulatory treatment of illness with a less important role for inpatient treatments and limited role for preventive and public health services (Hanson and Berman 1998:196). The health sector reform package in developing countries also refers to a shift from free services to fee-for-service or case-based reimbursement as part of cost recovery efforts.

Most ITN programmes have had a similar history. During trials, the service was free, but they have tried to move from a free service to a fee-for-service strategy after completion of the trial. The focus shifted to the insecticide rather than the net, since net treatment and re-treatment play a determinant role in ensuring long-term efficacy of ITNs. However, most programmes faced a sharp decline in coverage after the introduction of a cost recovery system. In The Gambia, although net treatment was well accepted and results of a small survey in 1993 (Mills et al. 1994) indicated willingness-to-pay up to $ 0.5 -1.0 per household for treatment of nets, the real purchasing behaviour some months later did not reflect the ideal behaviour foretold by the village heads in the survey. As a result, the high coverage of 85 percent net re-treatment when insecticide was provided free of charge dropped to only 14 percent after the introduction of small user charges. When the strategy was altered in 1994, for instance by selling insecticide sachets through shops as alternative outlets, a slightly higher coverage was achieved, but the result (16 percent) was still disappointing (Cham et al. 1997, Muller et al. 1997).

In Kenya, sentinel delivery stations were set-up at easily accessible locations throughout the study area for cost-free dipping (Snow et al. 1999). Despite intensive campaigns, the change of strategy from house-to-house visits to central dipping stations resulted in a drop in coverage from nearly 100 percent in 1993-1995 to 61-67 percent in 1996, even though net treatment was free. In 1997, social marketing was introduced including product development around the insecticide, promotion through football tournaments, song competitions and shopping bags carrying the logo for the product, and developing new delivery channels involving the private sector and cost recovery. This last step meant that re-dipping agents were trained to become entrepreneurs to take over the sentinel delivery stations. At least in part

because of the rapid transition, the coverage for re-treatment services dropped from 61-67 percent to 7 percent.

This combined experience suggests that innovative efforts in the distribution of nets and insecticide in ways that are sustainable for providers and users are urgently needed. Some researchers have examined whether increased community participation can contribute to malaria control in general (Manderson 1992) and ITNs programmes in particular (Mills et al. 1994). A well-known example is the Bagamoyo Bed Net Project in Tanzania (Winch et al. 1994, Makemba et al. 1995, Premji 1996). In contrast to the above mentioned trials the communities were involved from the beginning in the planning, implementation and administration under supervision of the project team (Makemba et al. 1995). Seven steps were carried out including formative research (Winch et al. 1994), selection and training of committee members, sales, promotion and distribution of nets, post-distribution follow-up and promotion of regular re-treatment. The thirteen study villages were divided into four groups, and the intervention was implemented in one group of villages at a time, at intervals of six months. A mosquito net committee was formed in each village and, after training, entrusted with distribution, re-treatment, sales, and promotion of mosquito nets and insecticide. Each committee collected money through the sale of nets and deposited it in a mosquito net committee bank account as a revolving fund (Makemba et al. 1995). In Group I sales were initially only 34-60 percent but picked up after modifications in net distribution had been made and reached 69-85 percent. In Group II the sales reached 54-67 percent. Re-treatment was first offered at no charge, but later a small user fee was introduced . The initial high coverage rates decreased in all villages following the introduction of user fees, for instance in Group I from 68 to 20 percent in the first village, from 59 to 20 percent in the second village and from 77 to 55 percent in the third village (Winch et al. 1997). The experience of the Bagamoyo project indicates that various

factors at the village, district and national level play an important role in determining whether the program becomes sustainable when external funding ends (Makemba et al. 1995). One question is whether the revolving funds can be sustained, another problem is whether nets will still be bought after the project subsidies stop, and the third challenge is to guarantee the supply of mosquito nets and insecticide when the project moves out.

In terms of implementation strategies, this project, like many other community involvement efforts, faced the challenge that it was labour intensive, time consuming and thus difficult to scale up to district, regional or even national levels. Moreover, this strategy does not seem to have solved the problem of financial sustainability.

1.6. Conclusions

Today, the WHO recommends an integrative strategy to combat malaria. This strategy ranges from developing new medicines and vaccines, improvements of health care systems, to insecticide treated nets (ITNs). In the past decade, controlled trials showed that ITNs reduce morbidity and mortality from malaria. It was estimated that in sub-Saharan Africa about 6 lives for every 1000 children protected in the age group 1-59 months can be saved every year, if regular and proper use of ITN is guaranteed. In areas where parasites have become increasingly resistant to anti-malarial drugs like chloroquine, access to health services is limited and medication often inappropriate, ITN technology presents an attractive option that can effectively complement the main malaria control strategy based on early diagnosis and prompt treatment.

However, effectiveness in operational terms can only be achieved, if social and economic factors affecting feasibility of routine utilisation and re-treatment of ITNs as well as the sustainability of such interventions are taken into account.

Chapter 2 Social, cultural and economic research on ITNs

A number of authors have described the relevance of social, cultural and economic research for understanding the views of the population on the transmission, diagnosis, treatment and prevention of malaria (Rosenfield et al. 1981, Koss and Kloos 1989, Vlassoff 1991, Gomes 1993), although in comparison with other infectious diseases, such as diarrhoea (Nichter 1993), relatively little work has been done on malaria (Agyepong et al. 1995:3).

Some of the first studies were carried out in The Gambia prior to (MacCormack and Snow 1986) and during (MacCormack et al. 1989) the field trials which showed that morbidity from malaria can be reduced by targeted chemoprophylaxis with maloprim and the use of permethrin treated mosquito nets (Snow et al. 1988). After the encouraging results from the subsequent large-scale mortality study (Alonso et al. 1991) and before extension to the rest of the country and other African countries, additional studies on social, cultural and economic aspects relating to ITNs were carried out (Aikins et al. 1993, Aikins et al. 1994).

2.1. Key topics

The examination of two key topics has become a standard approach in subsequent inquiries into social, cultural and economic aspects of ITNs (see Table 1), namely the study of

1. people's perceptions of malaria and beliefs about its causes, and of
2. people's behaviour regarding prevention of mosquitoes and malaria.

Research into these topics has shown that settings differ not only in terms of ecological and epidemiological factors, for instance the entomological inoculation rates indicating transmission pressure, but also with regard to social, cultural and economic contexts. Several interventions and trials therefore incorporated a programme for social research into the study design.

Table 1 Selected findings of social science studies on ITNs in Africa

1) Local knowledge about causes of malaria	
Terminology and classification of symptoms relating to malaria	No specific local term for malaria in The Gambia; commonly used names refer to symptoms such as fever, headache, etc.(Aikins et al. 1993)
Mosquito-malaria link	In The Gambia people mentioned many different causes relating to malaria in addition to mosquitoes (MacCormack and Snow 1986). In Ghana, Guinea-Bissau and Sierra Leone nearly half the respondents considered mosquitoes to be a cause of malaria; in Senegal and Gambia only one quarter of respondents mentioned mosquitoes as a cause of malaria (Aikins et al. 1994).
2) Local practices in mosquito prevention	
Control measures	In Ghana, Guinea Bissau, Sierra Leone, Senegal and The Gambia people mentioned using pieces of cloth, fans or palm leaves etc., burning mosquito coils, dried orange peel, or aerosol sprays to drive mosquitoes away (Aikins et al. 1994)
Current net use	In The Gambia, without any intervention 99% of rural Mandinka were sleeping under locally made mosquito nets a practice which dates back as far as 1894 (Aikins et al. 1993), but net use was less popular among the Wolof (64%) and Fula (58%) (MacCormack and Snow 1986). In Senegal about one third of people reported using nets but in Sierra Leone and Ghana very few did so (Aikins et al. 1994)
Types of mosquito nets preferred (colour, size, shape)	In The Gambia, the Mandinka preferred white mosquito nets (MacCormack and Snow 1986), whereas the Fula were in favour of opaque fabrics because they lasted longer, through many washings, and were strong enough to protect against rats, lizards and snakes and their droppings (MacCormack et al. 1989).
Current sleeping arrangements	In polygamous Mandinka families bedrooms commonly contained four five to six beds each with a woman and her young children, mosquito nets provided some privacy

Washing of mosquito nets	Some Mandinka women (10%) disliked being asked not to wash their nets for several months after treatment for hygienic reasons (MacCormack and Snow 1986).
Factors influencing use of mosquito nets	Reasons for having nets among the Mandinka in The Gambia (MacCormack and Snow 1986) included protection from mosquitoes and other biting insects (37%), protection from rats, lizards etc. and their droppings (21%), gives privacy while in bed (16%), protect from dust (14%), protects napping children from harm by rats, snakes etc. (6%), provides warmth in cold rainy season (3%), allows undisturbed sleep (2%), prevent disease (1%), looks nice (1%). In Ghana, Guinea Bissau, Sierra Leone, Senegal and The Gambia studies found little correlation between the perceived role of mosquitoes in the transmission of malaria and the use of mosquito nets (Aikins et al. 1994) In Ghana, Guinea Bissau, Sierra Leone, Senegal and The Gambia people mentioned financial constraints as a reason for not owning a net (Aikins et al. 1994). As the study in The Gambia showed most people did not associate mosquitoes with the transmission of malaria, mosquito nets have been used for at least 100 years mainly in the wet season to prevent mosquitoes disturbing sleep (Aikins et al. 1993). In a trial in The Gambia, most women (97%) using permethrin treated nets in Fula villages said they like the treated nets very much because they were effective against nuisance insects including bed bugs and lice and requested treatment to be continued; in the placebo-treated group, only few (9.9%) of the women made similar positive comments (MacCormack et al. 1989). Since bias may be introduced by direct questions on the willingness to pay for mosquito nets in area where villagers have heard about a mosquito net project they were asked an open ended question: "If you have a good harvest this year what are the most important purchases you will make?" Health was given low priority among the items of expenditure (MacCormack et al. 1989).

2.2. An example from Ghana

In northern Ghana, social science studies were conducted in preparation for (Gyapong et al. 1996) and during (Binka and Adongo 1997) the large-scale ITNs trial in the Kassena-Nankana District. The exploratory study of 184 individuals in 12 selected compounds (Gyapong et al. 1996) covered most of the key topics listed in Table 1. In terms of perceptions and beliefs, it confirmed earlier reports that people in this area know very little about mosquitoes as a malaria-transmitting vector. Even though people did not associate mosquitoes with malaria, they were much concerned about the nuisance effects of insects in general and mosquitoes in particular, especially if their sleep was disturbed. Common measures to drive away mosquitoes were smoke from burning millet husks and sheanut[1], putting strong scented shrubs around the sleeping mat and, if money was available, the use of coils and sprays was considered. Very few people in the area had mosquito nets, but when treated nets were introduced as part of this pre-study, they used them and commented on the benefit of undisturbed sleep. The reasons why they had not used mosquito nets before the pre-study were that few nets were available on the market, and households had little money to spend on nets. Since the pre-study showed that the preferred colour for nets was not white but brown and especially mothers and grandmothers sleeping with small children liked family size nets, nets of this type were later distributed in the large-scale trial. Although people did not sleep on beds, they managed to hang and use their nets effectively. Data on washing nets and seasonality are not reported in this study. Very few people complained about side effects from sleeping under a treated net during the pre-study, which was an encouraging result for the large-scale trial. The nets were distributed free of charge, but people claimed they would be willing to buy nets after they had harvested and sold some crops.

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[1] More precisely, the by-product from the production of shea butter oil is burned to generate smoke (Binka and Adongo 1997:84)

After this exploratory study a baseline survey using focus group discussions and structured questionnaires was conducted, followed by focus group discussions during the mid-intervention survey and a structured questionnaire in the post-intervention survey (Binka and Adongo 1997). All in all, the findings of the exploratory study were confirmed in these surveys of a larger sample (N=2000 individuals in 800 compounds).

The survey data on local practices in mosquito prevention can also be grouped according to the standard set of issues listed in Table 1. Local measures to drive mosquitoes away were the same as reported in the exploratory study. Before the start of the trial, only 4 percent of the compounds reported having at least one mosquito net. During the intervention 30,000 mosquito nets were supplied free of charge to all residents in the 6,000 compounds of the study sample. Most people (70 percent) said they slept under nets to prevent mosquito bites and another 27 percent because they wanted to have "a good night sleep". Sleeping arrangements differed, but the majority (72 percent) slept on mats indoors during the rain season and outdoors during the dry season and managed to hang the nets correctly (97 percent). Actual use differed with the season ranging from 20 percent during the dry season to almost 100 percent during the rain season. The main reasons given for this low use during the dry season were low density of mosquitoes and high temperatures at night. Since the insecticide is effective for six months, provided the nets are not washed during this time, this message was emphasised at the time of net distribution and again reinforced during each re-treatment visit. It was reported that 93 percent of respondents complied with this instruction.

Data on opinions about nets treated with insecticide were similar to those collected in the exploratory phase. People reported very few side effects like itching (3 percent), sneezing (2 percent), headaches (3 percent), cough (2 percent) and dizziness (1 percent). This might be an underestimate because members in these ethnic groups consider it impolite to complain about gifts.

Willingness to pay was also examined. During the intervention, mosquito nets and insecticide were provided free of charge. After two years of using ITNs, nearly all the persons who had received a mosquito net (99 percent) reported to be ready to replace them if they were badly torn, but only 67 percent and 78 percent said they would be prepared to pay for replacing net or insecticide, respectively. The price they were willing to pay (US$ 2) was less than half the actual cost of the mosquito net (US$ 5). They were more likely to pay the full cost of the insecticide because of the small amount of money involved. This reflects, on one hand, the low incomes of the people in this area, while on the other hand it may represent a community effort to influence the eventual price, if mosquito nets were to be commercially sold.

2.3. Malaria perceptions and beliefs

Several studies which were not necessarily concerned with ITNs provide evidence on the key topics and related issues listed in Table 1. For example they have examined local concepts referring to similar symptoms as biomedically defined malaria, symptoms which are often attributed to several distinct causes. A study in Accra, Ghana, for example, showed that both rural and urban respondents use “fever” as a dominant term for malaria (Agyepong and Manderson 1994:322). The terms “fever” and *asra* were used interchangeably referring to a number of symptoms that, when taken together, roughly correspond with a clinical diagnosis of malaria. Respondents mentioned various causes of “fever” including exposure to heat from sun or fire, eating oily or starchy food, mosquitoes and unhygienic surroundings. In the rural area most respondents cited exposure to heat from sun or fire as the most important cause of “fever”. Although rural and urban respondents shared a concern about "fever” as a major illness, they differed in terms of their explanation of causes. Half of the rural respondents (50 percent) but only 17 percent of urban respondents attributed “fever” to heat of the sun. Only few rural respondents (10 percent) mentioned mosquitoes as the primary cause of “fever” compared with nearly half (47 percent) of the

urban respondents. This variation in people's perceptions of malaria may reflect, at least partly, differentials in exposure to health education.

Research in preparation for the Bagamoyo Bed Net Project in Tanzania found that the local term *homa* was used to refer to both fever as a symptom, to febrile illnesses or to illnesses in general (Winch et al. 1994). The local classification system in the study area recognised various types of illnesses, and each type was associated with a different cause. Two major groups of *homa* illnesses were discerned. The first group consisted of severe and not easily treated illnesses referred to as the "out-of-the-ordinary" fevers *(homa zisizo za kawaida).* The second group comprised of mild illnesses and was described as "ordinary-everyday" fevers *(homa za kawaida)* which either go away on their own without treatment or can easily be cured. "Malaria" was included in the latter category. Moreover, even though malaria fever *(homa ya malaria)* was rightly perceived to be caused by mosquitoes, it did not correspond to the biomedically defined malaria. Since "malaria fever" was subsumed under the category of mild illnesses, people did not seek early treatment, therefore increasing the risk of mild illness becoming severe.

In the Kilifi District, Kenya, mild malaria was seen as related to mosquitoes (Mwenesi 1993). In addition to mosquitoes, some respondents believed that malaria was spread through other ways such as weather changes (exposure to extreme cold or heat), getting wet and sharing of bedding and utensils. However, conditions such as convulsions, splenomegaly and anaemia, though acknowledged as serious childhood illnesses, were not recognised as possible consequences of malaria. They were perceived as separate illness entities having different etiologies and, therefore, requiring a different course of treatment. One of the ethnic groups in this district, the Mijikenda, attributed the causes of convulsions to an "animal or bird" which enters the child, while the Luo, in a neighbouring group, ascribed convulsions to intestinal worms finding their way into the head of the child. In this study, the illness etiology of convulsions has been shown to have an influence on treatment choice: a

child suffering from convulsions was taken to a traditional healer who divined the animal responsible for the attack and then administered herbal remedies.

Several studies have further investigated people's practices in mosquito prevention and factors influencing these practices.

2.4. Behaviour and practices in mosquito prevention

2.4.1 Diverse control measures

According to studies in various countries, people have been using various methods to protect themselves against mosquito nuisance (see Table 2).

Table 2 Different mosquito-prevention measures reported by respondents surveyed in Africa (%) (Source: Zimicki: 1996:129)

Area	Coils	Sprays	Nets	Smoke	Any	Source
Cameroon (Yaoundé)	18	60	15	0	84	Desfontaine et al. 1989
Cameroon (Douala)	37	40	48	0	91	Desfontaine et al. 1990
Kenya (Uriri)	56	40	48	0	91	Sexton et. al. 1990
Malawi (rural area)	16	11	07	18	52	Ziba et al. 1994

In Yaoundé, most households mentioned sprays followed by coils and nets, while Douala households reported higher proportions of net use compared to sprays and coils. The observed differences between the two towns in Cameroon has been explained in terms of lower mosquito prevalence in Yaoundé compared to Douala (Zimicki 1996:129). In rural communities in Malawi, a much lower prevalence of preventive methods was observed even though the researchers asked about methods requiring no cash outlay. The study carried out in Uriri, a rural area in Western Kenya, identified higher

rates of use of coils and sprays compared to Malawi and a similar low mosquito net use.

A more detailed study (Evans 1994 in Feilden 1996:67) in urban Dar es Salaam, Tanzania, documented a reasonably high net coverage in urban households (Table 3). The study established whether measures against mosquitoes were used alone or in combination. Of the households with nets, most used nets alone or in combination with coils, followed by those using nets and sprays. Coils were most frequently used among households without nets, while a few households mentioned using sprays or a combination of coils and sprays and almost as many doing nothing.

Table 3 Multiple methods of mosquito control (%) in Dar es Salaam, Tanzania (Source: Feilden 1996:67)

Control measure	Households with net (62%)	Households without nets (38%)
Net alone	38	0
Coils and sprays	13	10
Coils	34	64
Sprays	17	09
Nothing	0	16

The existing evidence seems to suggest that use of mosquito nets is higher in West Africa than in East Africa and in cities than in rural areas (Zimicki 1996:130). Differentials between net use certainly exist, not only between regions but also within regions, and even within cities, villages, and households.

2.4.2 Factors influencing net use

2.4.2.1 Disease etiology

It has been widely assumed that local ideas about disease etiology may explain the underlying motivation for individual choices and decisions in the context of malaria prevention and control. However, even in those places where the mosquito-malaria link is clearly understood, studies have shown differences in terms of using available preventive measures. Several surveys indicate little correlation between the perceived role of mosquitoes in transmitting malaria and net.

Table 4 Cause of malaria and frequency of net use (Source Zimicki: 1996:133)

Area	Say mosquitoes cause malaria (%)	Use nets (%)	Sample size	Source
Ibadan Nigeria	28	0	1935	Ramakrishna et al.(1990)
Central Gambia	28	86	996	Aikins et al. (1993)
Malawi	55	7	1531	Ziba et al.(1994)
Savalou, Benin	75	41	1841	Rashed et al.(1999)

Some of the variations in causal attribution from these data may be an "artefact of questioning" (Zimicki 1996:134) as the conceptual links were not always carefully explored. Often, conceptual links were simply inferred from whether or not people mentioned mosquitoes as a cause of malaria or people were allowed only one answer.

Many studies have confirmed that the main reason for using mosquito nets was *not* malaria prevention but rather their ability to protect against mosquito and other nuisance insects.

Table 5 Reported benefits of mosquito net use in Africa

Area	Reported reason for net use	Source
The Gambia	Privacy and protection	MacComarck and Snow 1989
Kenya	Protection against mosquito bites	Sexton et al. 1990
Tanzania	Protection against biting insects (incl. bed bugs, fleas)	Njunwa et al. 1991
Tanzania	Protection against mosquito nuisance	Winch et al. 1994
Ghana	Protection against mosquito bites for good night sleep	Binka and Adongo 1997
Benin	Protection against mosquitoes for better sleep	Rashed et al. 1999

The perceived benefit of ITNs may, indeed, be enhanced by their ability to protect against other nuisance insects in addition to mosquitoes in general. In Muheza, Tanzania, it was reported that after the distribution of ITNs, villagers reported enthusiastically, and without prompting, on the death of mosquitoes near nets and the disappearance of other pest insects including bed bugs fleas and even in some cases, cockroaches (Njunwa et al. 1991). In Savalou, Benin mosquito nets were often seen as a means of protection against mosquitoes in order to sleep better rather than as a means of fending off malaria (Rashed et al. 1999).

2.4.2.2 Socio-economic status

Another issue examined in several studies are differences in people's socio-economic status in relation to net use. A study in a rural area of The Gambia tried to identify indicators of economic status, such as ownership of social status items or income, but found them difficult to define (Aikins et al.1993: 28). Contrary to expectation, income was inversely related to bed net usage although this association was not statistically significant. The four main

socio-economic variables related to bed net usage in the study were ethnic group, marital status, age, and ownership of radio/cassette players.

A study in Malawi reported that only a very small proportion, 4-5 percent, of very poor (N=798) and poor (N=304) households own a net compared to 10 percent of moderately wealthy (N=292) and 19 percent of wealthy (N=131) households (Chitsulo et al. 1992 in Zimicki 1996:131).

A further study in an urban district of Brazzaville, Congo, used "comprehension of the French language" as an indicator for socio-economic status (Carme et al. 1992:321). It was found that those families with lower socio-economic status (whose comprehension of French language was also low) were less likely to use chemoprophylaxis, to have antimalarials in the home, and to own mosquito nets. However in all socio-economic categories in this study, the frequencies of systematic treatment of fever, use of correct chloroquine dosage, and use of insecticides or insect repellents were similar.

The evidence from these different studies is not unequivocal. In areas of low net use, it has been shown that the association with socio-economic status may be strong, while net use in areas where overall net use is high, socio-economic status seems to have relatively little influence (Chitsulo et al. 1992 in Zimicki 1996).

2.4.2.3 Age and gender

Few studies have documented age and gender differentials in mosquito net studies. In The Gambia older people were more likely to use nets than younger ones (Aikins et al. 1994). Before the ITNs project started in Bagamoyo, Tanzania, it was reported that it was mainly the adult men who used the nets, followed by women and children under two who sleep with their mothers, while elder children were frequently the last to gain access (Makemba et.al. 1995). The acquisition of household goods, which foster health, is often subject to a process of negotiation and differential power based on gender (Tanner and Vlassoff 1998). It has been reported from Benin that women in particular mentioned lack of access to money as a reason for not using mosquito nets, whereas men often mentioned costs. Even though women's income was lower than that of their husbands, it allowed them to purchase nets at their own will (Rashed et al. 1999). In Bagamoyo, some women even cited lack of control over the household budget as a reason for not re-treating their nets (Winch et al. 1997). They stated that a wife may be willing to re-treat nets but does not have the money, while the husband may not assign high priority to treatment of the nets.

2.4.2.4 Affordability

Affordability is a central problem influencing net use, and it seems important to distinguish between at least four aspects: 1) The amount of cash available in the form of disposable income in the household, 2) the question of who makes decisions regarding household expenditures, 3) "willingness to pay" and 4) differentials in household expenditures.

The first point can be illustrated by Evans' study in Dar es Salaam, Tanzania, where even in an urban wage-earning economy 27 percent of the respondents said they did not own a net because they could not afford the initial investment (Evans 1994 in Feilden 1996:61).

The second point has already been mentioned above in the examples on gender differentials in access to household income.

With regard to the third point Feilden (1996:72) has cautioned that answers regarding "willingness to pay" may not be very reliable because they refer to hypothetical situations. This has in fact been shown by the experience in The Gambia quoted earlier (see Chapter 1.4) where a survey indicated that people were willing to pay US$ 0.5 to US$ 1.0 for re-treatment per household but when the price was set at US$ 0.5 per net user rates still dropped (Cham et al. 1997). The study concludes that cash income of rural Gambians is very limited and payment of even US$ 2-3 for insecticide treatment of all mosquito nets in a household represents a substantial outlay.

Fourth, household expenditure on prevention and treatment deserves close attention. According to a study in Bobo-Dioulasso, Burkina Faso, the total expenditure for prevention (N=150) for the preceding transmission season over a period of six months was US$ 4993, with an average cost of US$ 33.29 per family (Guiguembe et al. 1994). For malaria treatment which includes self-medication either by plant remedies or modern drugs, and medical prescriptions shows a total cost ranging from US$ 1.58 to US$ 188.52, with an average of US$ 42.27 per family. Referring to the statistics in this study, Feilden (1996:72) argues that the distribution is skewed and that the mean is inflated by relatively few high-spending households resulting into unrealistic average that overstate households expenditure and ability to pay.

Differentials in average expenditure between households have to be taken into account, and the percentage spent on malaria control may actually be higher among low-income households. In Dar es Salaam, for instance, high–income households were found to spend only 3.1 percent of declared income on all control methods while low–income households spent 7.4 percent (Evans 1994, in Feilden 1996:72). Moreover, as Zimicki (1996:137) correctly points out, one should not assume that money currently spent on preventive measures and malaria treatment is available for purchasing nets. As the above studies on the use of different malaria control methods have shown, ITNs do not completely substitute other methods like coils or sprays. Even owners of ITNs need protection during the evening when they sit

outdoors before going under the net (Evans 1994, in Feilden 1996:67). They may also sleep outdoors in hot weather or when they are in their fields during the harvest period (Winch et al. 1993, in Feilden 1996:70).

2.4.2.5 Seasonality

Differentials in mosquito density due to micro-ecological and or seasonal factors have been mentioned by several authors as important aspects explaining differential patterns in net usage (Zimicki 1996:134). What the earliest study (MacCormack and Snow 1986) pointed out has been confirmed not only for West Africa (Aikins et al. 1994, Binka 1997) but also for Tanzania in East Africa (Winch et al. 1994), namely people perceive the risk of malaria to be directly proportional to the size of the mosquito population and thus to fluctuate with seasons. Moreover, as mentioned above, the benefit attached to ITNs by the majority of people in malarial areas is usually associated with the reduction of nuisance biting from mosquitoes and other insects rather than protection against malaria. It may, therefore, be difficult to motivate people for continuous use of ITNs and re-treatment during the dry season when mosquito densities are low.

In addition, particularly in rural areas, the cash flow is also influenced by seasonal factors. Most households' income is available during the dry season after harvest, and this may further constrain people's ability to buy and/or treat nets. If, therefore, the mosquito cycle and the cash flow cycle do not correspond it will be even more difficult to convince people to spend their limited amount of cash on ITNs and insecticide.

2.5 Conclusions

Over the past decade the combined effort of all these studies has contributed to the development of a systematic approach, which will inform the current study. The regions covered by these studies show considerable diversity geographically, they span across desert, savannah and tropical rain forests, and in terms of cultural and social dimensions, they embrace many different groups with distinct traditions but also a common experience of

colonial and global processes, although this experience differs in kind and degree. People's understanding of and response to illnesses including malaria have been and continue to be influenced by these wider forces, while people as actors also shape their beliefs and practices through their daily life. In the face of these geographical, social and cultural diversity it cannot be presumed that malaria control measures that are effective in one part of Africa will be equally effective in another, even if malaria transmission pressure is similar. Inquiries into people's beliefs and practices relating to malaria, the use and acceptability of ITNs and other measures of malaria control are needed in a variety of areas in order to tailor interventions to local needs, demands and conditions. The next chapter outlines previous experience with malaria control and especially ITNs interventions in Tanzania and, more specifically, in the Kilombero Valley and then narrows the focus on the Kilombero Treated Bed Net (KINET) project in Southern Tanzania.

Chapter 3 Malaria control efforts in Tanzania

3.1 Malaria control during the colonial period

Malaria control in Tanzania dates back to the German colonial period (Clyde 1967:28-32). The Germans introduced mosquito control measures as part of the general improvement in the sanitation of Dar es Salaam (see Fig. 2) from 1902 onwards and then launched a massive distribution of quinine to treat the entire urban population in Dar-es-Salaam and Tanga (Clyde 1967:40). Another measure was soil works for larval control in Dar es Salaam and Kilwa, followed by intensive drainage and other engineering works. Despite these measures, the malaria records prior to World War I reflected uncontrolled hyperendemicity. After the war, the British increased malaria control efforts, focusing mainly on the reduction of larval stages in urban areas (Clyde 1967:32).

Following World War II, anti-mosquito measures were extended to many smaller settlements. They included drainage and the spreading of larvicidal oil containing DDT on standing water surfaces. In order to test the possibility of using residual insecticides to interrupt malaria transmission in rural areas where malaria was highly endemic, a malaria control scheme was initiated in 1954 at Pare-Taveta in Tanzania and Kenya (Bradley 1991:248a). The results of this scheme and similar trials were disappointing, and it was concluded that "the orthodox methods of attacking malaria which have mainly been developed in other regions of the tropical world are not necessarily suited to equatorial Africa" (Wilson pers. com. in Clyde 1967:16). Towards the end of the British period, research into various aspects of malaria control in fields like epidemiology, parasitology, entomology and biomedicine increased and many surveys were carried out in urban and rural areas of Tanzania.

Figure 2 The location of Morogoro Region in Tanzania (Source: World Bank Report 1996)

3.2. Malaria control and Primary Health Care since Independence

After Independence in 1961, the Malaria Control Unit of the Ministry of Health assumed the responsibility for providing expert advice, guidelines and material input (Kilama and Kihamia 1991:203). Environmental and vector control measures in urban areas deteriorated over the next decades, partly because the main thrust of health development in the socialist government under the first president, the late Mwalimu J.K. Nyerere, was directed to the previously neglected rural areas where more than 90 percent of the population lived. The main thrust of health development in general was to provide access to services for all, in which malaria treatment and control would be integrated. An indication of what was involved in the conceptualisation and practice of health development in Tanzania was the country's commitment to health as an integral part of national development even before the Primary Health Care (PHC) strategy was launched in 1978. The government of then ruling Tanganyika African National Union (TANU) party was determined to mobilise the country's resources towards eliminating the three great enemies of development of the new nation, namely poverty, ignorance and diseases (Nyerere 1968:14). Following the 1967 Arusha Declaration - a blue print for a socialist development strategy called *Ujamaa* or "family-hood" - the focus on health and education received high priority. In fact, the party spearheaded a number of campaigns to improve villagers' health through mass education (Ngakuka 1985:24). Perhaps most famous are the campaigns called *Mtu ni Afya* (Man is Health) and *Chakula ni Uhai* (Food is Life) in which approximately 1.5 million people participated. Smaller campaigns were carried out at the outbreaks of diseases like cholera, dysentery and other communicable diseases (Hall 1978).

The implementation and outcome of *Ujamaa* and self-help policy in Tanzania have remained a subject of debate (Heggenhougen et al.

1987:26). To some observers, the Tanzanian experience was inspirational and fascinating because of the astounding achievements reached under difficult conditions. Other observers contend that the reality of the policy has been frustrating and not measured up to the initial expectations. Despite varied contentions regarding the levels of success, it is undeniable that Tanzania achieved a series of improvements under the *Ujamaa* philosophy-cum policy. For instance the general health status of the population improved and the average life expectancy increased from 35 years at Independence in 1961 to 52 years in 1980, and infant mortality decreased from 160 deaths per 1000 live births in 1967 to 135 per 1000 in 1978, notwithstanding considerable regional variations (Heggenhougen et al. 1987:28). Most notable as improvement has been the development of health care infrastructure in rural areas in the period since the Arusha Declaration in 1967.

The reorientation towards the rural population, the mass health education programmes like *Mtu ni Afya* which included components on water, sanitation, malaria and the impressive growth of the rural health care infrastructure shown in Table 6 is a proof for the commitment of Tanzania to the PHC strategy. In combination, all these efforts provided a sound framework for the implementation of the revised malaria control guidelines of the WHO Expert Committee in 1979, particularly with regard to two of the recommended tactical variants (Kilama 1985). The objective of the first variant was to reduce and prevent malaria mortality by efficient distribution of antimalarials to the acutely ill. The second variant aimed at reducing and preventing malaria mortality and morbidity through efficient distribution of chemoprophylaxis to targeted groups. The increased health units and trained health personnel in rural areas facilitated distribution. This set-up allowed for efficient diagnosis and delivery of antimalarial drugs to more than 90 percent of the country's population. Kilama (1985:16) reported a huge increase in the number of chloroquine tablets issued through the Central Medical Stores from 102 million in 1975/76 to 300 million in 1980/81.

Table 6 Rural health care infrastructure 1961-80 (Source: Heggenhougen et al. 1987:28)

	1961	1972	Actual 1980	Target 1980
Health centres	22	22	239	300
Dispensaries	975	1501	2600	2300
Medical assistants	200	335	1400	1200
Rural medical aides	380	578	2310	2800
MCH aides/Village midwives	400	700	2070	2500
Health assistants	150	290	681	1800

There were also problems associated with the post-independence policy. Organised vector control in urban areas had reached its peak in the early 1970s (Kilama and Kihamia 1991:199). From the mid-1970s, it rapidly deteriorated, at least partly due to the rural bias of the socialist oriented state policies. Even in the rural areas, the newly established rural health structure could not be kept up. The government had tried to do too much too quickly with limited resources, and the situation was further exacerbated by economic problems caused by factors external and internal to the country. As a result, particularly in the 1980s, government health services suffered from a lack of equipment, drugs and transportation, and complaints of a negative attitude of certain staff members towards patients, of inadequate quality of care and of poor management and organization were increasing (Hamel 1983, in Heggenhougen et al. 1987:311).

In the early 1990s, renewed efforts to control malaria were made by the National Malaria Control Programme in collaboration with local and international agencies and focused on well defined tasks (Overseas Development Agency Report 1996). WHO supported the training of clinical staff in the management of severe and complicated malaria;

the Danish International Development Agency (DANIDA) provided assistance by supplying the drugs such as antimalarials for the national Essential Drugs Programme, and the Japanese International Co-operation Agency (JICA) in collaboration with the Ministry of Health launched an urban-based vector control project in Dar-es-Salaam and Tanga between 1988 and 1996.

In spite of these efforts, malaria is still the leading cause of both morbidity and mortality in Tanzania (Overseas Development Agency Report 1996:10). Malaria specific mortality is notoriously difficult to measure, but recent MOH estimates show that malaria accounts for approximately 17 percent of deaths nation-wide, most of them occurring among children under five. Some estimates are even higher. A Social Sector Review of 1995 came to the conclusion that out of the total number of deaths (411) in a cohort of 1000 children, nearly a third, that is 120 (29 percent), were caused by malaria. Efforts to curb the disease are further thwarted by the growing problem of malaria parasite resistance which has reached a range of 28 to 72 percent in the late 1990s (Ministry of Health 1999).

3.3. ITNs studies and interventions

In view of this situation Tanzania, like many other countries (see Chapter 1.4), began to explore the potential of ITNs in the mid-1980s. One of the first village scale trials was conducted in Muheza, an area of high malaria transmission (Lyimo et al. 1991, Njunwa et al.1991). The results showed an impressive decrease in mosquito densities, and a marked reduction in the percentage of children with high malaria parasite densities and in fever attack rates following the introduction of ITNs, although there was considerable variations between villages. A similar study carried out in Zanzibar, to find out whether ITNs delayed the rate of infection of *P.falciparum* demonstrated a lower force of infection in

children under five years in the intervention village compared to the control (Stich et al.1994). Although these findings have been questioned due to methodological problems and therefore reliability in terms of their conclusions, they were remarkably important in early demonstration of the impact of ITNs on malaria morbidity in an area of high malaria transmission.

Based on these findings and evidence from several other places in Africa like The Gambia, Cameroon and Mali, UNICEF began to support the distribution of ITNs to under fives and pregnant women in parts of Iringa, Morogoro, Mtwara and Arusha between 1991 and 1996 (Overseas Development Agency Report 1996:21). However, there is no available information on any evaluation of the programme operations and implementation. In discussions with the UNICEF staff, low mosquito net re-treatment coverage was identified as an operational constraint but the reasons are not clear. The major constraint reported for this programme was the high cost, and the poor financing mechanisms that existed to handle the sizeable procurement of nets required to sustain the project. The difficulties have been summarised in terms of the inherent problems related to donor-driven projects with little prospects of sustainability in the long term.

Also in the early 1990s, the Bagamoyo Mosquito net Project was initiated along the coast in the northern part of Dar es Salaam (Premji et al.1997). It is a milestone in terms of trying out new ways of involving local communities. As discussed earlier in Chapter 1.5, mosquito net committees selected by their own communities became local level implementers responsible for sales and distribution of mosquito nets and insecticide in their own villages. Instead of local people being considered merely as beneficiaries they were involved as active actors and their knowledge and experiences were taken into account in different stages of the project. Following extensive social and cultural research into local perceptions of malaria the project was designed and

implemented in dialogue with the villagers. Early on this approach brought to light that virtually all villagers in Bagamoyo acknowledged the problem of mosquito nuisance but that, to them, it was a seasonal problem. Research in other countries has also emphasised this point but the project team in Bagamoyo analysed it from many different angles (Winch et al. 1994). Their main argument was that

> "both the diagnosis and treatment of febrile illnesses are affected by what season people think it is, by what illnesses they think are common in each season, and also by their perceptions of how abundant mosquitoes are" (Winch et al.1994:63)

This means, in other words, that people's diagnosis of malaria was based more on the circumstances under which they had fallen ill than on the actual symptoms they felt or observed. For Winch and his colleagues the understanding of this logic is highly relevant for ITN projects because it may help to explain why people do not see the necessity of sleeping under mosquito nets when mosquito density is low. One could argue that this logic is very different from biomedical thinking because it gives circumstances in which things happen, for instance a person falls ill, more weight than merely the perception of symptoms. Based on such assumptions a febrile illness would be more likely to be interpreted as *homa ya malaria* (malaria fever) during the rainy season when mosquitoes are abundant than during the dry season when mosquitoes are few. The main challenge according to the team was thus,

> "to develop locally appropriate messages and communication materials that can explain how it is possible that malaria can be a threat even when mosquitoes are few" (Winch et al. 1994:74).

As the earlier discussion has shown (see Chapter 1.5), the project showed success at first but this could not be sustained. Nevertheless, the important insights provided by the Bagamoyo project have opened new lines of inquiry: First, one should try to understand people's own logic regarding the mosquito-malaria-link, even if it seems to contradict biomedical thinking. Secondly, the main challenge is to convince

people to sleep under a net to prevent malaria, even if mosquitoes are few.

3.4 Malaria research and control in the Kilombero Valley

The Kilombero Valley is located in the Morogoro Region of southern Tanzania (see Fig. 2). Malaria is considered the foremost health problem in the area, both by the health services and the people (Tanner et al 1991). For many years, researchers based at the Ifakara Health Research and Development Centre (IHRDC), formerly the "Swiss Tropical Institute Field Laboratory" have been involved in many different strands of malaria research and continue to contribute to it (Freyvogel 1994, Tanner 1994, Swiss Tropical Institute 1998, Swiss Tropical Institute 2000). The following discussion focuses on selected investigations which pertain to the present study.

Several investigations examined the characteristics of malaria transmission (Tanner et al. 1991, Kilombero Malaria Project 1992, Smith et al.1993; Charlwood et al.1995, Kitua 1996, Kitua et al. 1997). *P. falciparum* malaria transmission is intense and perennial, despite large fluctuations in mosquito densities with a peak during the rain season. The main malaria vectors are members of the *Anopheles gambiae* complex and A*nopheles funestus,* with an estimated 200-300 infective bites per person per year (Smith et al. 1993). Life-threatening malaria in most of the area occurs largely in children, and commonly presents in those under one year old (Snow et al. 1994).

Of particular interest in the context of the present study are a number of investigations examining the social, cultural context of health problems and behavioural aspects of malaria. Two studies aimed at assessing the potential of antimalarial medicinal plants and their use in the treatment

of malaria by traditional healers (Gessler 1995, Gessler et al. 1995, Mathies 1998). They also investigated where people seek help in addition to the formal government or mission health care system and provided valuable information on local terms for malaria and conditions that closely correspond to this biomedical concept (Gessler 1995:83). A third study focused on health seeking behaviour and examined delay in treatment seeking in cases of mild and severe malaria (Hausmann 2000). All three studies report a distinction between ethnomedical and biomedical explanatory models of causation associated with complicated forms of malaria. "Traditional healers" and "common people" differentiate between different types of illnesses which in biomedical terms they may all be manifestations of malaria infections. Their classification is based on perceived seriousness of observable symptoms. The severity of the symptoms presented determines the healers' and patients' response and choice of treatment. The local health care system offers a complex set of symbolic meanings that are interpreted situationally to categorise malaria symptoms and remedies.

3.4.1 Previous experience with ITNs

One study has explicitly examined social, cultural factors affecting adoption and non-adoption of the ITNs technology within the framework of a small-scale project - the Rotary Net Initiative funded by the Rotary Foundation (Mlangwa 1998). Since 1993 UNICEF had distributed dark green treated mosquito nets in some villages in the Kilombero Valley through Ward Executive officers. Due to organisational and operational limitations the project did not continue beyond 1993. In 1995 the Rotary Net Initiative started selling and promoting unbranded treated nets on a small scale level covering Ifakara town, the headquarters of Kilombero District and six nearby villages. The project assessed different channels for selling ITNs and net treatment services (Fraser-Hurt and Lyimo 1998).

While the Bagamoyo Mosquito net Project organised mosquito net committees and involved them in different steps of the implementation, the Rotary Net Initiative trusted in a multiplier effect. The basic assumption was that, if the project facilitated the import of high-quality nets and their sale through existing or new outlets, a multiplier effect could be achieved**.** However, the findings of this study show that integrating ITNs, and especially insecticide net treatment and re-treatment practice, into routine lives of the local people will remain a serious challenge for ITNs projects. The following three factors seem particularly important for compliance: 1) to own surplus cash for prompt re-treatment; 2) to perceive the benefit of net re-treatment, especially during the dry season; and 3) to remember the dates for re-treatment (Mlangwa 1998).

The reports from the Bagamoyo Bednet Project and and the Rotary Net initiative show that both projects faced similar operational problems. Firstly, a generally low demand for insecticide treatment and re-treatment of nets, particularly during the dry season when mosquitoes are few, remains a challenge for ITN programmes. Ideally, the expectation was that if nets were available and community members were encouraged to use them and perceived their advantages, other would follow their example. Secondly, strategies are needed to remunerate local people or if they are working voluntarily, to motivate and sustain them if local people are to participate and organise community-based control activities.

Plate 1 Shop owner selling branded Zuia Mbu nets in Mchombe village (Photo: C. Lengeler)

Plate 2 Billboard promoting and advertising Zuia Mbu products (Photo: C. Lengeler)

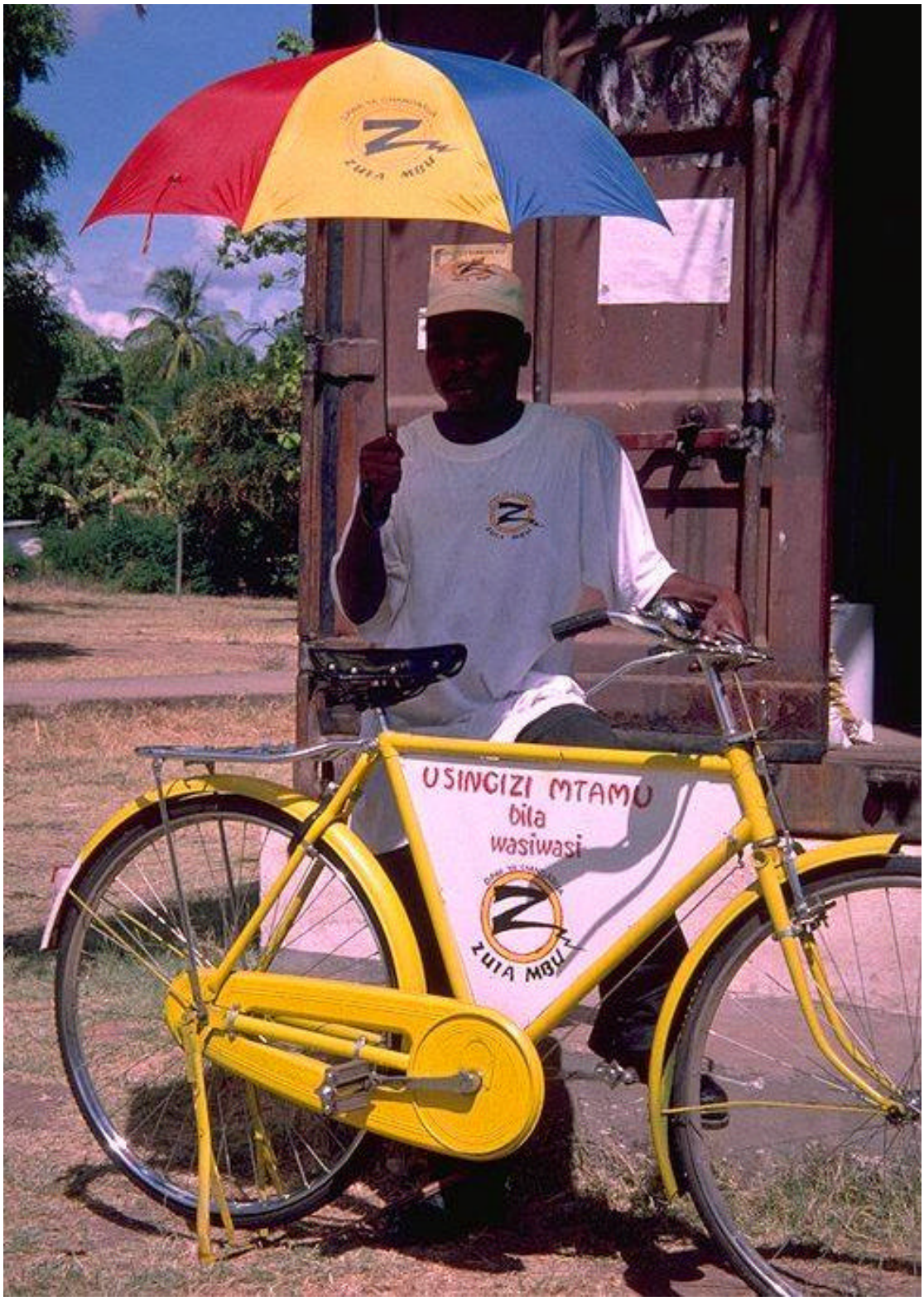


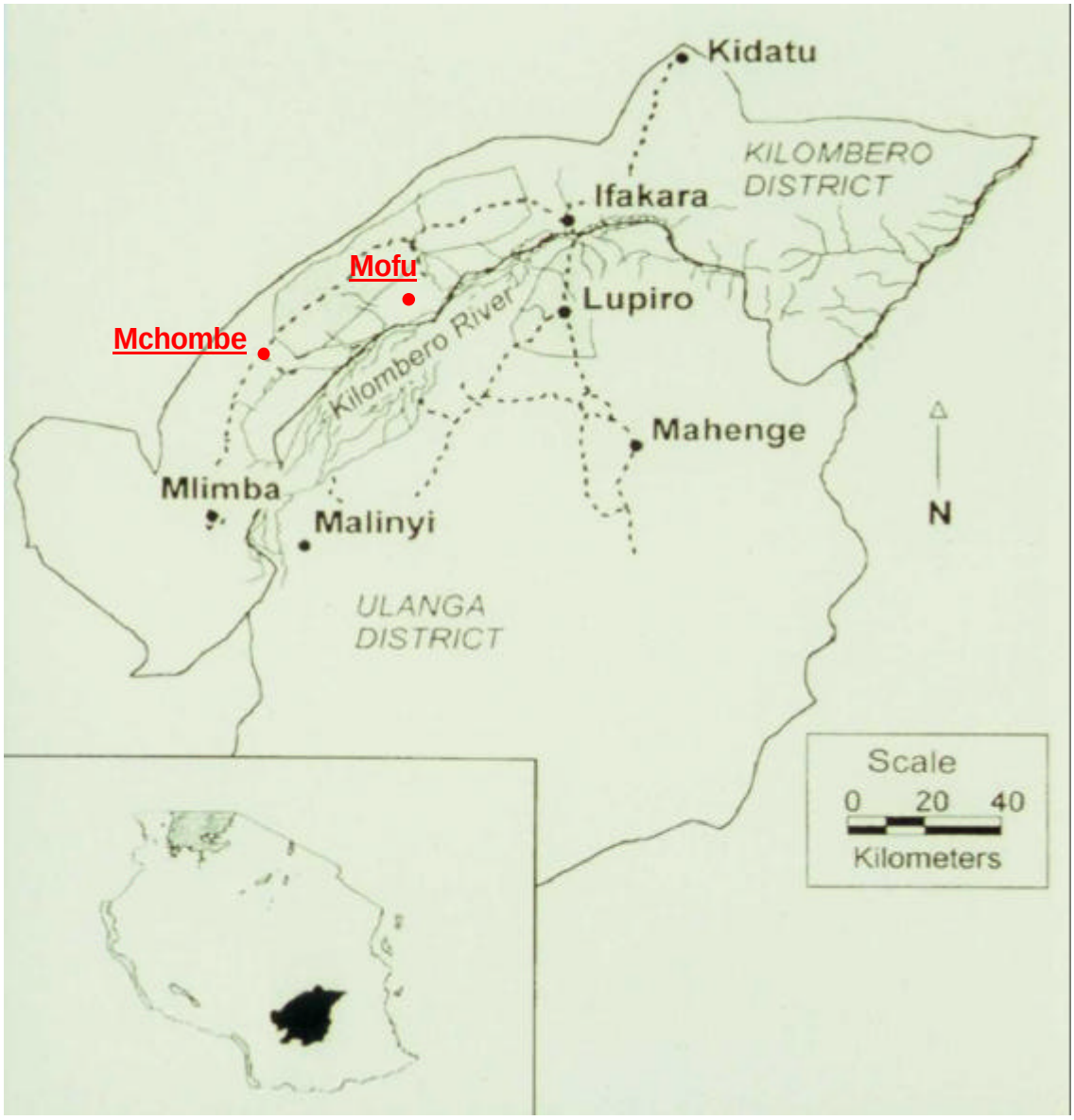
Plate 3 Umbrella, T-shirt and bicycle advertising Zuia Mbu products (Photo: C. Lengeler)

3.4.2 The KINET project and its approach

In 1996, the Kilombero Net Project was launched to promote ITNs on a much larger scale, Phase 1 beginning in 18 villages of the Kilombero Valley (see Fig. 3). The Swiss Agency for Development and Co-operation (SDC) sponsored this project based on an agreement between the governments of Tanzania and Switzerland (Project Document 1996:12). KINET was designed to investigate how the effectiveness of ITNs can be sustained under real life conditions (see Chapter 1.4 and 1.5). It uses an innovative, social marketing approach to distribute nets and insecticide to a rural population of 350,000 people. Introduced in 1971, the social marketing approach to planned social change (Kotler and Roberto 1989) has become a distinct subdiscipline within the general field of academic marketing over the past fifteen years (Andreasen 1995:3). In the 1980s and 1990s, it has been used increasingly in health programs. Its main goal is to influence behaviour, whether this means to make people buy condoms, to practice safe sex or to get their children immunised. Like other programs and projects in Africa, for instance in the Central African Republic in 1996 or in Rwanda, Kenya and Zimbabwe in 1997, KINET aimed to encourage people to buy ITNs and to regularly retreat their nets (Armstrong Schellenberg et al. 1999).

Following basic principles of the social marketing approach, KINET put much emphasis on understanding the knowledge and practice of the main target groups within the villagers. It further paid much attention to developing branded products, namely ITNs and single-dose insecticide treatment sachets, and to advertising and marketing the products systematically (see Plates 1, 2 and 3). After investigating issues relating not only to the products but also to price, place and promotion, KINET built up a marketing system to bring its products to the customers, that is; different segments of villagers.

Figure 3 Project area and study sites



In addition to this implementation component which used a social marketing approach, KINET had a monitoring component. For this second purpose, a Demographic Surveillance System (DSS) was set up in 18 villages covering a population of 55,000 people. Field assistants based in the villages visited each household every four months and collected data on vital demographic events such as births, deaths and migration.

A multidisciplinary team organised the KINET implementation and monitoring activities. It consisted of epidemiologists, a demographer, a health economist, a social scientist (the author of the present study), a marketing manager, a data manager, field-based assistants and supervisors. From the beginning, stakeholders of the public sector, for instance the District Health Management Teams and the Ministry of Health, and of private sector such as international, national and local businessmen have been involved.

During the first year, a total of 22,410 nets and 8072 treatments were sold (Armstrong Schellenberg et al. 1999). Eighteen months after launching, 46 percent of 312 families with children aged under 5 years reported that their children were sleeping under treated nets.

3.5 Conclusions

This chapter has shown that Tanzania has a long history in malaria control. Moreover, biomedical knowledge and practice has changed over the decades, and so has the political framework within which interventions have been carried out. In recent years, ITN studies, programmes and projects have been carried out in Tanzania, for instance in Muheza near Tanga, in Zanzibar, in several locations served by the UNICEF and in the Bagamoyo Project.

People in the Kilombero Valley, the area of the present study, have also been exposed to changing strategies in malaria control for many decades, also to ITN interventions. Social marketing as a strategy of promoting and distributing ITNs is only the last step in a long process, also from the point of view of the villagers. ITNs as a malaria control tool and the social marketing approach chosen by KINET are not introduced in a vacuum, but in a social reality where different traditions of knowledge and practices relating to malaria already exist. How KINET reaches out to villagers and how different men and women respond to the KINET has to be examined in specific villages, hamlets and households, in the context of day-to-day life and local interpretations of past and current experiences with malaria and malaria control.

PART II OBJECTIVES, CONCEPTUAL FRAMEWORK AND METHODS

Chapter 4 Goal and objectives

The goal of this study was:

To conduct qualitative research to learn about social and cultural aspects affecting effectiveness of ITNs, in terms of people's knowledge and practices on the household level, and to study how this can contribute to improve the intervention process.

Objective 1

To examine the local knowledge and practice relating to malaria, its transmission, preventive measures (against malaria and mosquitoes) and people's previous experiences with mosquito nets.

Specific objectives:

1. To describe the local illness terminology relating to biomedically defined malaria.
2. To study existing understandings regarding the cause, symptoms, treatment and prevention of malaria and related illnesses.
3. To investigate people's views of the link between mosquitoes and malaria.
4. To document local protective measures against mosquitoes, and especially previous experiences with mosquito nets.

Objective 2

To analyse the dynamic aspects of knowledge and its communication, particularly the interplay and interface between local and global knowledge and communication systems.

Specific objectives:

1. To inquire into ways in which knowledge and practice about malaria generated in the global network of universities and research institutions which guides KINET is disseminated through various communication channels.
2. To examine how local knowledge and practice about illnesses related to malaria is taken up by KINET.
3. To study how people respond to the ideas propagated and the activities initiated by KINET.

Objective 3

To conduct a gender analysis on the household level in terms of the acquisition, use and ownership ofITNs.

Specific objectives:

1. To describe local household structures and patterns of male and female headship.
2. To examine household headship in relation to net ownership.
3. To identify factors limiting and enabling women to take action regarding ITNs on the household level.

Chapter 5 Conceptual framework

The literature review in this study has shown that much research has been done to critically evaluate the efficacy of ITNs, that is the impact of ITNs on malaria morbidity and mortality, under carefully controlled trial conditions. Accordingly, for any attempt to recommend large-scale implementation of ITN interventions, accurate evidence on the efficacy of ITNs which allow the calculations of the number of malaria clinical cases or deaths averted by the ITN intervention in a given population is a basic prerequisite (see Lengeler and Snow 1996:327). Since most of the countries where malaria is endemic are poverty stricken and face extreme resource constraints, the efficacy estimates need to be supplemented with cost effectiveness estimates for a well-informed resource allocation. Consequently, it is becoming increasingly recognised that more research is needed on the effectiveness, not only in an epidemiological sense as informed by the measurements of health impact on the community and individual level under program conditions (see Lengeler and Snow 1996), but also on social and cultural aspects of effectiveness, that is on managerial, human and material elements important for successful implementation and use of ITNs. From an anthropological point of view, the study of social and cultural aspects of effectiveness focuses on people, what they think and do and how they interact with one another. The focus is not only on people in their day-to-day village life but also on interactions between project staff and village people, and the villagers' responses to project activities.

For the most part, much social science research on malaria control examined people's responses to the disease in the frame of treatment seeking behaviour. Such research has often been framed in terms of Knowledge, Attitude, Belief and Practice (KABP). Underlying these concepts is a supposed opposition between "knowledge" - understood as correct and reliable knowledge based on biological sciences that can be measurably verified with a high degree of probability - and

"belief" - seen as erroneous or less reliable and often irrational ideas rooted in local traditions. This dualism of knowledge versus beliefs is implicit in most research carried out within medical behavioural sciences (Good 1994:37).

Public health specialists have often called for anthropologists when they encountered "barriers" to the introduction of biomedical knowledge and practice in traditional communities (Foster 1984). They often saw these barriers as "lack of knowledge" and existence of "wrong beliefs". Their aim was, therefore, to examine people's knowledge, respectively their lack of knowledge, about certain biomedically defined disease constructs, their prevention and treatment, and to investigate people's probably irrational or exotic beliefs and practices.

Implicit in such approaches is an empiricisttheory which sees knowledge

> "as the holding of a correct representation of some aspect of the world, and an understanding of the knowing subject as an individual who holds an accurate representation of the natural world, derived from sense experience and represented in thought" (Good 1994:9).

This theory, in other words, assumes that scientific knowledge represents the natural world, and that an individual man or woman can become a knowing subject based on his or her sense experience which is then represented in the mind. Knowledge, in this sense, is seen as the product of individual cognition. It can be modified and improved by correct education.

In the cultural sciences, this theory has been subjected to ever growing critique because scientific knowledge is largely assumed to be normative, the individual actor is analytically primary and applications focus on the education of individuals to modify their behaviour (see Good 1994:36). Social and cultural processes and contexts are not taken into account.

Over the past decades, an alternative view has been developed which represents a historicist theory of knowledge, also of medical knowledge:

> "This tradition provides a basis for an analytic strategy that views biomedicine as one form of knowledge among many, rather than as a depiction of the biological world that can serve as the norm for judging all other accounts" (Good 1994:88).

This theoretical position holds that biomedical knowledge and practice is a powerful tradition, but not *a priori* more correct representation of disease and especially illness experience than other medical traditions (see Kleinman 1980, Kleinman 1995, Lindenbaum and Lock 1993, Good 1994). It considers biomedicine as a historically evolved tradition with particular achievements and limitations like other historically and geographically distinct medical traditions. Moreover, it emphasises the social and cultural aspects of knowledge: knowledge is seen as embedded in interpretive practices of people who interact with one another and the natural world. Knowledge, in other words, is seen as generated in and communicated through interpretive practices, as a personal and social construction:

> "The researcher's knowledge: that of the epidemiologist, the economist, the public health physician, as much as the ethnographer and clinician is a construction not so very different in kind, though often quite different in degree of systemisation and control, from that of the informant" (Kleinman 1995:77).

This interpretive perspective which brings knowledge and practice to the forefront in understanding real people in their real worlds informs the present study. It has been elaborated in much greater depth and detail by Byron Good (1994), one of the best known medical anthropologists, and, in more general terms, it has become widely accepted in anthropological research.

Consequently, the production of anthropological knowledge in ethnographic research is now seen as an interpretive process. This idea

has been well-formulated by Gilles Bibeau, another well-known medical anthropologist:

> "Actions are made intelligible through the interpretation of the social actors themselves, that is, what people have to say about what they do and the reasons for their actions. These discourses of participants represent the point of view of the actors themselves and constitute basic information for the social scientist. These first-level interpretations must serve as the basis for any anthropological understanding of meaning. This indigenous exegesis provides cues and guidelines for the anthropologist to make second-level interpretations of behaviour, thus allowing for generalisations" (Bibeau 1997:252).

Anthropological knowledge, in other words, is based, first, on people's interpretations of their actions, and second, on the anthropologist's interpretation of what various actors have said and done. The study of people, in contrast to research on plants, germs or stones, involves a double interpretation because people - as well as the anthropologists who study them - create and live in meaningful worlds.

The above quotation is also relevant for another purpose: it draws attention to the close and complex relationship between knowledge and practice. Some people in certain situations are able to verbalise some of the knowledge which guides their practice, as suggested by Bibeau (see above). In other cases, however, people are unable to express what they know and think; their knowledge is implicit, tacit and embedded in practice. In still other cases, people may have knowledge about a certain issue but not act accordingly. Moreover, as discussed above, knowledge itself can be seen as generated in and communicated through interpretive practice. Since knowledge and practice are closely interrelated, anthropologists hardly investigate one without taking the other into considerations.

An interpretive view of knowledge and practice opens new lines of inquiry in research on health and illness. Since it emphasises that knowledge is produced and reproduced by people who interact with one another and the natural world, it shifts the focus from the individual

as the knowing subject to individuals as social actors who interact and communicate with one another. It involves people as active participants who talk to each other, who discuss, negotiate, rework, or quarrel about differences in knowledge and practice, and often subvert the meanings and issues transmitted through external sources. It also raises questions about diverse forms of authority and power which are closely linked with knowledge and practice. In other words, it creates a space for the examination of dynamic aspects in generating and transmitting knowledge and in putting knowledge into practice.

The present study uses this interpretive approach to examine various aspects of knowledge and practice in malaria control: ITN interventions. It develops an innovative approach which provides more insights into social and cultural aspects of effectiveness than previous social science research employing a KABP approach.

Chapter 6 Overview of chapters

The third part of the thesis shifts the focus to the main topic and the area of this study. Chapter 7 presents the study setting, the design and the methods. It briefly describes the Kilombero Valley and the people who live there, narrows the focus on the KINET project and even further on the social science component within this project. The research design and process is then briefly outlined step by step.

Chapter 8 presents the Kilombero Treated Net Project which provides the wider framework of this study. It characterises the social marketing approach with its emphasis on the four "P's", namely place, product, price, promotion, and describes each of them. After this outline of the intervention, the chapter then moves on to the second part, to the evaluation, and presents the first results on demography, willingness to pay and sales.

The next chapter shifts the focus to the central theme of these thesis: the local knowledge and practice relating to malaria and ITNs. Chapter 9 relates to the first objective (see Chapter 4) and discusses the findings of the formative stage in this field research. Drawing on key issues raised in previous studies, it examines local concepts of malaria, associated treatment practices, prevention of malaria and related illnesses and available measures to control malaria and mosquitoes. It then shows how people's views and practices were used as a basis for the development of the IEC campaign.

Chapter 10 continues the discussion of knowledge and practice but shifts the emphasis to the second objective, namely the interface between knowledge and practice which existed in the area prior to the KINET project and knowledge and practice that was brought into the area by the project. To examine this interface, the study draws on a model developed by Mundy and Compton (1995) for investigations into cultural dimensions of development and applies it to inquire into

this particular ITN intervention. It will be argued that several lessons for the improvement of the intervention have been learnt from the application of a modified version of this model.

Chapter 11 and 12 address the third objective, namely the gender analysis on the household level. Since headship is often taken as a proxy for the study of power relations between men and women, Chapter 11 presents the findings of a study which examines the meanings of the analytical category "headship" in a particular context, namely in the largest urban area of Tanzania, in Dar es Salaam. It shows that headship should not just be seen in economic terms but also implies authority and respect.

The concept of headship is taken up again in Chapter 12 and used to examine, how gender influences the acquisition, ownership and use of ITNs in households of this rural area. Headship refers to household structures and also to economic activities. What is of particular interest here is whether mothers and other female caretakers only bear responsibilities or also have the means to fulfil them. Another central issue is the place of ITNs in current household arrangements, and whether gender and age differentials influence the actual use of ITNs.

Chapter 13 situates the methodological approach of this study against the background of the much more common KABP approach, critically reflects on the methods used, discusses the reliability and validity of the findings, and highlights the most important findings and their implications for future research and interventions.

PART III PEOPLE'S KNOWLEDGE AND PRACTICE RELATING TO MALARIA AND ITN IN THE KILOMBERO VALLEY

Chapter 7 Study setting, design and methods

7.1 The area and the people

The site of the KINET project, the Kilombero Valley in southern Tanzania (see Fig. 2 and 3) is a broad flood plain formed by the Kilombero River between the Udzungwa and Mahenge Highlands (see Plates 4 and 5. The climate of the Kilombero Valley is highly seasonal with floods during the rainy season from November to May and droughts during the dry season from June to October. The annual rainfall ranges from 1200 to 1800 mm (Tanner et al. 1991). Malaria is largely due to *P. falciparum.* Transmission is intense and perennial with a peak during the rainy season (Tanner et al. 1991, Smith et al.1993).

As in other parts of Tanzania, rural life has been profoundly influenced by the postcolonial efforts to improve the lives of the majority. Six years after Independence, Tanzania firmly committed herself to building an egalitarian society through socialism and a self-reliance policy as outlined in the Arusha Declaration of 1967.

In the early 1970s, the social engineering project to build communal villages called *vijiji vya ujamaa* (*Ujamaa* villages) brought the scattered inhabitants who lived in remote locations along the margins of the river plain to organised village centres in the Kilombero Valley. Ideally, a village was envisaged to have a primary school, a dispensary and a clean water supply system. It should also have a primary co-operative society or a buying post for the cash crop(s) grown in the village. A mosque or/and church were also considered as basic social services in a village. The consequences of the movement to resettle rural populations into model villages has been a subject of intense debate. It has been argued that villages are successful as organisational units for government services but not yet as organisational public production units (Collier et al. 1986).

Plate 4 Moving in Kilombero Valley involves crossing rivers. (Photo: H. Minja)

Plate 5 he flood plain is bordered by hills (Photo: H. Minja)

The health care system has of course also been affected by the changes of the political and economic circumstances since Independence. As in other rural areas of Tanzania, the government built up an extensive district health system comprising district hospitals, health centres, dispensaries, health posts and village health workers. Despite these efforts and many achievements in terms of the established health structure, the health provision at the district level has deteriorated and faces many financial and operational problems (Kikwawila Study Group 1995).

Most villages in the study area are located along unpaved roads which link the villages with the district headquarters. During the heaviest rains between March and April, some villages are cut off by flooding. In the dry season, the villagers depend on privately owned buses and pick up trucks running between the district headquarters and the villages on a daily basis.

The Kilombero Valley is characterised by remarkable tribal heterogeneity. It is not uncommon to find members of thirty tribes in one village. The heterogeneity is due to traditional migration patterns, colonial settlement policies and the above mentioned villagisation policy of the early 1970s. The tribal groups referred to as indigenous people, for instance the Wandamba, Wambunga and Wapogoro, arrived in the early part of the 19th century from Malawi and the southern part of Tanzania. The Wandamba are closely related to the Wapogoro who occupy the western part of the valley basin and the adjacent Mahenge Highlands. Other tribes which migrated to Kilombero Valley at the beginning of this century include the Wasagara, Wahehe, Wabena Wandendeule Wanyamwezi, Wasukuma, Wangoni, Wangindo, Wamaasai, Wamang'ati, Wachagga and Wasafwa, to mention only a few. In addition, the construction of the railway line between Tanzania and Zambia (TAZARA) in 1972 brought an influx of other ethnic groups from different parts of the country such as the Wanyakusa, Wandali,

Wakinga and Wakisi to the valley. These intrusions resulted in the Wandamba being forced out into the swampy and inaccessible central region of the valley. Swahili is the lingua franca, but in day-to-day life, people often speak their own languages.

Economic activity in the Kilombero Valley is shaped by four most important factors: the flood levels of the Kilombero River; the soils; the cultural influences of immigrants; and the economic inclinations as well as the customs of the various ethnic groups found in the area.

Most villagers commonly grow rice, maize and cassava for household consumption. Production of rice and to a lesser extent of maize also caters for household cash flow as they are sold to private buyers for trading on the local market and export to other regions of Tanzania. A social economic survey in 1993 (KVTC 1993) estimated that around 60% of the households of the Kilombero District produce rice and maize crops below subsistence levels. This is perhaps not surprising since most villagers use a simple hand hoe to cultivate about 5 acres of land to generate food and income to cover the household's needs including shelter, health, education and clothes. Many local houses are built with mud walls and thatched roofs while up to one third have brick walls and corrugated iron roofs (Armstrong Schellenberg et al.1999).

Households utilise family labour and, during planting, weeding and harvesting receive help from neighbours based on a rotational support system. The family life organisation in the area is mainly patrilineal: the members of a lineage trace their descent in the male line. This has implications for resource allocation such as land ownership, household labour organisation and rights over other properties. Some men earn an additional income as casual labourers, petty traders and fishermen. Women sell their farm produce or their labour in the villages to earn some cash. Child labour is most visible during weekends and school holidays, but in fact, many school-age children stay at home helping the

parents, as the family is unable to pay for school fees or to buy school uniforms.

Different types of support networks and groups are common. The most dynamic and efficient ones include those which form at times of emergencies such as deaths and funerals and follow local norms and values. They act as safety nets during crises and make substantial material and emotional contributions in terms of food, drinks, and comfort for a substantial period. Other informal yet organised groups such rotating credit organisations, ethnic associations and occupational groups like fishermen or carpenters as well as loosely organised women's groups exist and follow different modalities. Most of them are based on ethnic backgrounds, family, friendship, gender and age.

7.2 The KINET project

In 1996, the Kilombero Net (KINET) project established its headquarters in Ifakara, the administrative centre of the Kilombero District, where the St. Francis Designated District Hospital (SFDDH) and the Ifakara Health Research and Development Center (IHRDC) are located. In Phase I, KINET begun working on 18 villages (see Fig. 3). These villages were selected because their locations are logistically practical. They are situated along the mud roads leading from Ifakara into the Kilombero and Ulanga Districts. Moreover, they share similar climatic, demographic, social and agricultural characteristics.

As outlined earlier, the KINET project comprises two components: implementation and monitoring/evaluation. The implementation component centres around the establishment of a distribution system for ITNs using a social marketing approach which integrates public and private providers and reaches out to a population of 350,000. For evaluation, KINET set up a Demographic Surveillance System covering 50,000 people in the above-mentioned 18 villages to monitor long-term

effects of ITNs on child health and survival and to assess the costs of the intervention (Shellenberg et al 1999).

7.3. Social science component of the KINET project

The social science component of KINET was carried out in two stages which can be characterised as formative research (July 1996 to June 1997) and ethnographic monitoring (July 1997 to March 1999). Formative research consisted of three sub-studies carried out in different sites: 1) a community study in 18 villages of the project Phase I area, 2) a short ethnographic study in two villages, and 3) a survey in four villages. Ethnographic monitoring was conducted in another village.

7.3.1 Community study in 18 villages

At the beginning of Phase I, the KINET team held meetings in all the selected 18 villages to inform the village members about the project objectives, structures and activities. During these meetings, a special effort was made to collect data on various aspects of each community, for instance on the ethnic composition of the village, on potential information and distribution channels, on health problems with a focus on malaria and preventive measures as well as opinions on how best to implement project activities. A variety of qualitative methods including group discussions, casual and in-depth interviews as well as observations were used.

7.3.2 Short ethnographic study in two villages

Based on the information collected during the community study, a short ethnographic fieldwork was planned and carried out in two villages with different levels of access to health services. The first village, Katindiuka, forms a neighbourhood of Ifakara town (see Figure 3). It was chosen because, being near to the town, the people had easy access to

modern health services and had been exposed to them for a long time. The second village, Mofu, was selected because it lies in a remote area about 55 km from Ifakara town and is often cut-off during heavy rains. This remoteness was expected to have an influence on villagers' health care utilisation patterns and health seeking practices.

The ethnographic study in these two villages made use of a combination of data collection techniques such as pile sorting, domain categorisation, focus group discussions, in-depth interviews, informal conversations and participant observation. It generated contextualised and rich information about people's knowledge of malaria and related elated illnesses, treatment practices, preventive measures against malaria and mosquitoes, and previous experiences with mosquito nets in general and ITNs in particular. The aim was to collect relevant information in two specific settings which could then be used for two main purposes: 1) as the basis for the development of the promotional campaign, and 2) in the definition of categories for a semi-structured questionnaire for the village survey.

7.3.3 Survey in four villages

After the village meetings and the short ethnographic study, a survey was carried out in four villages. These four villages were randomly selected from the 18 Phase I villages. A random proportionate sample was drawn in each village. To be included, a household had to contain an adult of 15 years of age and above. The survey aimed at examining the distribution of knowledge and practice observed during the ethnographic study in Katindiuka and Mofu in a larger sample representative of Phase I villages. The questionnaire was pre-tested in a nearby village and necessary adjustments were made. All interviews were conducted in Swahili by a trained team of KINET project fieldworkers who were based in the villages. The questionnaire included items on respondents' demographic characteristics, their knowledge

about malaria and related illnesses and their treatment and prevention practices including use of mosquito nets.

7.3.4 Ethnographic monitoring in one village

While the village survey yielded cross-sectional data at a given point in time, a fourth study component was designed to capture data on process aspect of the project implementation in one location over a period of time. This study was carried out in Mchombe village, about 80 km away from Ifakara town (see Fig. 3). Mchombe was founded about 100 years ago and is a comparatively large village with a population of 6789 (DSS 1997). Its size can be attributed to the fact that it assumes central functions for the area. In 1937, a Roman Catholic church and, in 1972, a station of TAZARA Railways were established in the village; and from 1973 onwards, people were resettled from their scattered homesteads following the villagisation program. Administratively the village is organised in eight units called *vitongoji* (neighbourhoods or hamlets). A *kitongoji* (Pl. *vitongoji*) consists of about 40 houses and has a chairperson who is a member of the village government. The neighbourhoods Mchombe A (see Plate 6) and Mchombe B have a population of about 667 and 629 people, respectively, and are found at the centre near the church and the railway station, where other social facilities such as two primary schools, a government dispensary and private shops are located.

Lukolongo, the hamlet selected for the extended ethnographic study, is situated next to Mchombe B and has a population of about 784. Compared to Mchombe A and Mchombe B, Lukolongo is more rural (see Plate 7). It is a residential as well as a farming area. Many people have their permanent houses and live in the area; they have their paddy and maize plots nearby. A good number of people also come to farm in Lukolongo but have their homesteads elsewhere. Moreover, most

inhabitants of Lukolongo – like most villagers in the Kilombero Valley – still own farmland in distant places where they lived before villagisation.

The aim of what we call "ethnographic monitoring" was to obtain insights into the processes involved in the acceptance and proper use of ITNs. In a first step, 150 households in Lukolongo were selected for an interview. The interview established a social profile and whether households owned an untreated or treated mosquito net. In a second step, 30 out of these 150 households were followed up to document knowledge and practice over a period of time with regard to correct use of available services from the project. Particular attention was paid to household structures, headship and net ownership.

Plate 6 A road in Mchombe A, lined with local shops (Photo: H. Minja)

Plate 7 A rural homestead in Lukolongo hamlet, Mchombe village (Photo: H. Minja)

Chapter 8 KINET: a social marketing programme of treated nets and net treatment for malaria control in Tanzania, with evaluation of child health and long-term survival

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Abstract

We present a large-scale social marketing programme of insecticide-treated nets in 2 rural districts in south-western Tanzania (population 350 000) and describe how the long-term child health and survival impact will be assessed. Formative and market research were conducted in order to understand community perceptions, knowledge, attitudes and practice with respect to the products to be socially marketed. We identified *Zuia Mbu* (Kiswahili for 'prevent mosquitoes') as a suitable brand name for both treated nets and single-dose insecticide treatment sachets. A mix of public and private sales outlets is used for distribution. In the first stage of a stepped introduction 31 net agents were appointed and trained in 18 villages: 15 were shop owners, 14 were village leaders, 1 was a parish priest and 1 a health worker. For net treatment 37 young people were appointed in the same villages and trained as agents. Further institutions in both districts such as hospitals, development projects and employers were also involved in distribution. Promotion for both products was intense and used a variety of channels. A total of 22 410 nets and 8072 treatments were sold during the first year: 18 months after launching, 46% of 312 families with children aged under 5 years reported that their children were sleeping under treated nets. A strong evaluation component in over 50 000 people allows assessment of the long-term effects of insecticide-treated nets on child health and survival, anaemia in pregnancy, and the costs of the intervention. This evaluation is based on cross-sectional surveys, and case-control and cohort studies.

8.1 Introduction

Despite malaria being the largest public health problem in Africa south of the Sahara, with over one million associated deaths each year (WHO, 1997), little progress has taken place in control during the past decades. Prompt treatment with an effective antimalarial remains the basis of malaria control strategies in most African countries (WHO, 1993). Preventive transmission control is being reconsidered using insecticide-treated nets (ITNs, including treated bednets and curtains) which do not require a large national programme infrastructure for implementation. In a meta-analysis of African trials ITNs were found to reduce clinical malaria episodes by 48% and to improve anaemia status by an average 0.5 g/dL (Lengeler, 1998). Most importantly, the regular use of ITNs under trial conditions prevents approximately 6 deaths for every 1000 children protected every year across a large range of transmission intensities. Many international agencies (e.g., UNICEF, WHO, World Bank, Organization of African Unity) have recognized that malaria control is an urgent priority in order to improve child survival and are now making plans for implementation of ITNs (WHO, 1996; UNICEF, 1998; USAID, 1998).

The translation of promising research results into effective public health action is a daunting task. There are at least 60 million children living in areas at risk for malaria in Africa and their nets, once provided, will need to be treated regularly (every 6-12 months) over many years. Feilden (1996) reviewed various options for financing and implementation of ITNs, most of which have been tried on a relatively small scale (up to 10 villages). These fall into 3 main implementation models: (1) the integration of ITNs distribution into a community pharmacy network (e.g., the Bamako Initiative pro- gramme in Western Kenya (Hill, 1991), (ii) sales through local health units (e.g., Fraser-Hurt & Lyimo, 1998) or the existing primary health care system (D'Alessandro *et al.,* 1995), and (iii) distribution through community groups (e.g., Premji *et al.* 1995). Despite much useful operational experience, it seems premature to recommend

specific large-scale ITNs implementation strategies for the African continent. The launch of a number of large programmes (population of over 100 000) using different pragmatic approaches will allow these strategies to be optimized.

Social marketing is a very flexible implementation model that has proved successful in resource-poor countries for interventions such as oral rehydration salts (ORS) and condoms (BASICS, 1998). Social marketing is an approach where the experience and methods of commercial marketing are applied to a product which has a social benefit, with the main motivation being social improvement rather than financial gain to the marketer (Andreasen, 1995). The approach usually uses a branded product that can be marketed and advertised professionally. Much attention is paid to the main target group-sometimes called customers-and much effort goes into understanding the perception, knowledge, attitudes and practices of this group. Social marketing entails an effective public-private partnership which may be particularly useful for ITNs: unlike drugs and vaccines, ITNs may be seen as a commercial commodity rather than a medical product. Social marketing of ITNs has recently been started in various African countries, for example, the Central African Republic (in 1996), Rwanda, Kenya and Zimbabwe (in 1997).

The long-term impact of ITNs an small children in areas with high malaria transmission (an arbitrary cut-off being an annual entomological inoculation rate over 100) remains a controversial issue. The potential con- sequences of delaying acquisition of immunity are worrying in that in such areas it has been suggested that overall survival could be better without ITNs (Snow *et al.,* 1997). However, good data an the issue are scant and the discussion has been based an indirect evidence. Following the discontinuation of malaria control trials in the past na evidence for a delay or a 'rebound ' in mortality was found (Molineaux & Gramiccia, 1980; Bradley, 1991; Greenwood, 1997). Further, the indirect

evidence presented to support the idea of a delay in child death in areas of high transmission has been questioned (D'alessandro & Coosemans, 1997; Lengeler *et al.,* 1997; Lines, 1997; Moljneaux, 1997). Only long-term randomized controlled trials could answer this question reliably but these would be unlikely to be ethical or acceptable to the communities involved. Not many alternative designs remain. One possibility is to compare users of ITNs to non-users in the frame of a large-scale programme: combining this estimate with information from coverage surveys would allow estimation of community effectiveness (Lengeler & Snow, 1996). Although the current debate does not warrant delaying the implementation of ITNs programmes the issue needs to be addressed and monitored by more than one large-scale ITNs programme.

We present an overview of the KINET (pronounced 'key-net') project in Tanzania. The project, based at the non-governmental Ifakara Health Research and Development Centre, has developed a social marketing system for getting nets and insecticide to a scattered rural population of 350000 people. A strong evaluation component in over 50 000 people allows monitoring of the long-term effects of ITNs an health and child survival, together with an assessment of the costs of the intervention.

8.2 Background

8.2.1 Study area

Kilombero and Ulanga Districts lie in Morogoro Region in south-westem Tanzania, about 320 km from Dar-es-Salaam (Fig. 3). Much of the area lies in the low- lying flood plain of the kilombero River (average altitude 270 m), which divides the 2 districts. The Udzungwa mountains lie to the northwest and there is also an upland area around Mahenge town (over 1000 m). The area has a rainy season from November to May, although ram may fall in any month of the year. Annual rainfall range is

approximately 1200-1800 mm. The population is about 350 000, with an average density of about 10 people 1km^2. There are 109 villages in the 2 districts, ranging in size from <1000 people to >6000. Average household size is about 5.5 people.

There is a wide mix of ethnic groups including Wandamba, Wapogoro, Wabena, Wabunga and Wahehe. Many local hauses have mud walls and thatched roofs, while up to one-third have brick walls and corrugated iran roofs. Rice, maize and cassava are commonly grown for home consumption. The main agricultural exports from both districts are rice, timber and charcoal. Fishing is also common, both for local consumption and for export as smoked fish to the towns of Morogoro and Dar-es-Salaam. Many families have a second hause known as a *shamba* (farm) hause in low-lying farmland areas where they stay during the rice-planting and harvesting seasons.

The public health system has a network of village health workers, health posts, dispensaries, health centres and hospitals with varying quality of care. In Ifakara town, the capital of Kilombero District, the main hospital is a large well-equipped mission Designated District Hospital. The hospital in Mahenge, the Ulanga District capital, has more limited facilities. There is a further mission hospital in Malinyi, serving the south-westem part of Ulanga District. The mother-and-child health (MCH) services are weil deveioped and vaccination coverage is high with 78% children receiving all Expanded Programme on Immunization (EPI) vaccines by age *1* year (F. Font, personal communication). There are no paved roads and some viilages are cut off tor parts of the year by flooding. Limited seasonal bus services run up to 3 times each day between the towns of Ifakara, Mahenge and Malinyi. The TAZARA railway links the towns of Ifakara and Mlimba.

8.2.2 Malaria and mosquito net use

Malaria is the foremost health problem as reported through the health services and as perceived by iocai people, both tor adults and children (Tanner *et al.,* 1991). Malaria transmission due to *Plasmodium falciparum* is intense and perennial, despite marked seasonality in mosquito densities with a peak in the rains. *Anopheles gambiae and An. funestus* are the main vectors, with an estimated 200-300 infective bites per person per year occurring in rural areas dose to Ifakara (Smith *et al.,* 1993). Life-threatening malaria in most of the area occurs largely in children, and commonly presents in those aged < 1 year (Snow et *al.,* 1994).

A baseline survey conducted in 1996 found that 37% of households (3817/10 299) had at least 1 net. The main motivation tor their use was mosquito nuisance rather than malaria control, with use being widely reported as seasonai. A previous study at the Ifakara Heaith Research and Deveiopment Centre aliowed preliminary assessment of various ways to distribute nets and net treatment in the area dose to Ifakara town (Fraser-Hurt & Lyimo, 1998).

8.3 The social marketing programme

We describe here the background work preparing the social marketing campaign from Juiy 1996 to May 1997, and then cover the issues of product, price, place and promotion.

8.3.1 Sensitization and market research

Sensitization meetings with village leaders were held in all the 18 villages of the Phase 1 distribution area (shaded area in Fig. 3). Each half-day meeting took the form of an open discussion between project and community ieaders of the health problems of the community, ways to prevent malaria including ITNs, and the issues of how to get ITNs to the community in a sustainable way. The concepts of sustainability and cost recovery led to long discussions: most community leaders had no previous experience of projects that aimed tor substantial cost recovery and found the concepts hard to understand. There was a common misconception that the Swahili term tor 'project' *(mradi)* involved being given things at little or no cost to the consumer.

An initial survey confirmed that virtually all people in the area knew of mosquito nets and that round and rectangular white polyester nets manufactured in Tanzania were generally available in the towns. Qualitative studies on community preferences tor different types of net suggested that rectangular, dark green, high-quality polyester nets were likely to be popular. They were needed in 2 sizes (180 X 150 X 100 cm and 180 X 150 X 130 cm) in order to accommodate local sleeping patterns. People said they would prefer coloured nets to white nets since they would not need washing as often. Many people had heard ot net treatment, owing to a previous UNICEF project in the area and to the avail- ability ot Rotary-tunded treated nets in Ifakara (Fraser- Hurt & Lyimo, 1998), but very tew had tried it.

Further qualitative studies in 2 small villages tound that malaria was often not perceived as a life-threatening problem, but as a fever-related illness which attacked all ages. This finding was confirmed by related work carried out at the same time in Ifakara town (Hausmann- Muela *et al.,* 1998). Severe conditions perceived as causing child deaths such as *bandama* (enlarged spleen), *degedege* (convulsions) and *homa kali*

(high fever) were not widely thought to be caused by malaria. Consequently, It was decided to highlight messages related to malaria as a cause of child deaths, including those seen as *bandama, degedege and homa kak* in promotion campaigns. Nuisance biting by mosquitoes was consistently telt to be a major problem and this was the main reason tor people using mosquito nets. Few people were aware that malaria-transmitting mosquitoes were more likely to bite late at night than in the early evening: without this knowledge it is hard tor people to understand how nets might prevent malaria.

We identified *Zuia Mbu* (Kiswahili tor 'prevent mosquitoes') as a suitable brand name for both treated nets and insecticide treatment. Thebrand name and a logo tor *Zuia Mbu* (Plate 8) were developed together with an advertising agency in Dar-es-Salaam and tested locally. The brand and logo are used on all products and promotional materials.

8.3.2 Products: nets and insecticide

Dark green polyester 100-denier 1 56-mesh nets were obtained from Siamdutch Ltd Thailand. Each net was pre-treated at the factory with 20 mglm^2 deltamethrin, and wrapped in a clear plastic bag with an insert containing information about Zuia Mbu.

The insecticide for net treatment was 2-5% lambda-cyhalothrin CS (capsule suspension), a water-based micro-encapsulated formulation produced by Zeneca Ltd (UK). The insecticide was re-packaged by a collaborating project in Dar-es-Salaam in individual 6-mL sachets, each containing enough to treat a single net of any locally available size (Miller *et al.,* 1998).

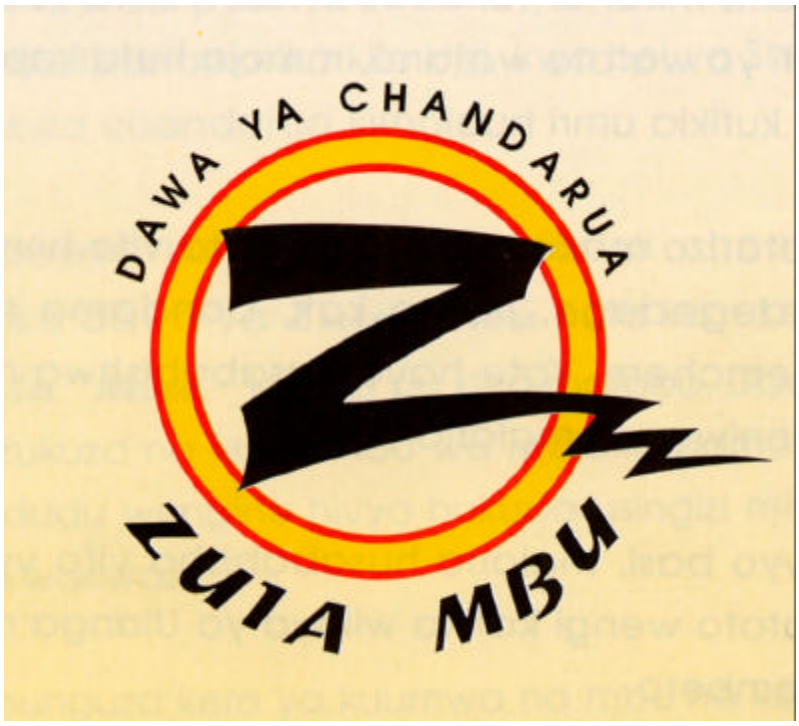

Plate 8 The logo used for the *Zuia Mbu* brand used by the KINET programme.

Plate 9 Poster 1 of the Zuia Mbu IEC campaign

8.3.3 Price

Village sensitization meetings and experience from a previous project (Fraser-Hurt & Lyimo, 1998) suggested that local people would be willing to pay near cost-recovery price for the nets, but rather less than cost-recovery price for the insecticide. Retail prices were set at TSh 3000 (~US$ 5.0) for either size of net and TSh 250 (~US$ O.42) for the insecticide treatment service. For nets, a commission of TSh 500 per net is paid to each retailer and a further commission of TSh 250 is paid to wholesalers. Thus the project recovers TSh 2250 (~US$ 3.75) for each net sold, or about 66% of the replacement cost including transport to Ifakara and packaging. For insecticide, a commission of TSh 125 per sachet is paid to the retailers and a fürther TSh 25 to wholesalers. The project therefore recovers TSh 100 (~US$ 0.17) for each sachet sold, about 17% of the replacement cost. Price control for nets, initially a particular worry of the community, is achieved by making the selling price clearly visible on the net packaging and by advertising the price widely.

8.3.4 Place: the distribution system

The social marketing of nets and insecticide was phased-in step-wise in 3 increasingly large areas. A flexible distribution system was chosen in conjunction with community leaders and community members in a series of open meetings. In the first phase, in village 2 sales agents for nets and a further 2 mobile sales agents for insecticide were chosen regardless of the size of the village. The agents were nominated by the villagers themselves, and included health workers, parish priests, community leaders and shopkeepers. Net sales agents and net treatment agents were both given a 1 -day training seminar, where they learnt how to treat nets and how to keep sales records. These records show the purchaser's name, balozi (local political leader), sub-village and village, and permit checks that the products have been sold within the study area. Twice-yearly re-training and review sessions are also held.

The net treatment agents were given a distinctly painted *Zuia Mbu* bicycle to assist with door-to-door sales, plastic basins, gloves, and plastic boxes for storage of sachets of insecticide. Nets and insecticide were initially supplied directly by project staff at weekly intervals, but as the project area enlarged a network of wholesalers was developed to keep agents supplied on a regular basis. Each agent has a contract with the Ifakara Health Research and Development Centre, and is paid on a commission basis (see 'Price' above). A reward system for reaching certain sales targets is also used. Agents who do not keep the terms of the contract are replaced.

8.3.5 Promotion and the voucher system for pregnant women and infants

A range of materials to support an information, education and communication (IEC) campaign was developed, including 3 posters (Plate 9) and a leaflet. These materials, each incorporating ideas from the qualitative studies, were drawn by a local artist and pilot-tested extensively before printing and distribution to health clinics, sales outlets, etc. Billboards were posted along the main roads and one local bus had the *Zuia Mbu* logo painted prominently on its side. The project worked together with the District Health Management Teams in both districts in preparing the campaign.

A discount system to reduce further the cost of a net for mothers of young children and pregnant women was developed for use through health clinics. This system is intended to increase use of treated nets in those most at risk of severe effects of malaria. All women attending antenatal clinics and those attending for routine immunizations are entitled to a discount voucher which gives them a TSh 500 (US$ 0.84 or 17% retail value) price reduction for a treated mosquito net. Their clinic attendance card is marked to show that they have received the

voucher. The voucher is then presented by the women to the net sales agentin their village. The sales agent then receives a credit from the project to the value of TSh 500 plus a TSh 50 hand ling charge.

8.3.6 Public-Private mix

KINET uses a pragmatic mix of activities involving the public and private sectors. Such mixes have recently been advocated as an effective strategic approach for arge- scale ITNs projects (USAID, 1998). KINET social marketing involves a collaboration between public entities such as the District Health Management Teams and the Ministry of Health the private sector such as international suppliers and local business people, and the project social-marketing team.

8.3.7 Launching and expansion

The treated nets and insecticide treatment service were launched in 2 large villages on 24 and 25 May 1997 with celebrations including community theatre, songs, a raffle and speeches from community leaders. During the following week sales of nets and insecticide started in all the 18 Phase 1 villages. The project expanded to cover a further 8 villages in December 1997, 35 in June 1998, 18 in December 1998 and will cover the remaining 30 villages early in 1999.

In order to facilitate this expansion in an efficient way, KINET is working to maximize inputs from local project partners such as local employers and mission hospitals. Project partners act as local distributors of *Zuia Mbu* nets and insecticide, using the same promotional materials and price structure, and as key players in the IEC campaign.

8.4 Project evaluation: the effect of ITNs on child health and survival

8.4.1 Socio-cultural aspects

Quantitative and qualitative work is being done, including periodic knowledge, attitude, beliefs and practices (KABP) studies, detailed community-based anthropological studies and semi-structured interviews with sales agents and customers. This work allows a review of how IEC messages are received in the community and the chance to see which new messages might be useful. In addition, it allows evaluation of the discount system and the sales agents themselves, with a view to making improvements so that customers are served better by the project.

8.4.2 Demographic surveillance system (DSS)

This system was started in September 1996 and operates in the 18 Phase 1 villages covered by the study (shaded area in Fig. 3). This area has a population of some 55000 people living in 11000 households. A baseline census was carried out from September to December 1996. Name, sex, date of birth, and relationships within the household were recorded. Household locations were noted on sketch-maps. Rough locations of any *shamba* houses were also recorded. Since January 1997 every household has been visited every 4 months by an interviewer who updates the census record by asking about in- and out-migrations, pregnancies, births and deaths. The system developed originally in Navrongo (Ghana) by BINKA *et al.* (1998) was used with few modifications. Special surveys are added from time to time: for example, the first census round in 1997 was used to record socio-economic status in the household, and educational level for each household member. The DSS gives a full sampling frame for the Phase 1 area, within which

vital events are monitored and random samples of households or individuals may be chosen for various in-depth studies.

8.4.3 Effect of treated nets on child survival

Two studies are under way within the DSS. First, a case-control study will assess risk factors for child mortality in the area, with a particular focus on use of nets, treated or untreated. Cases are children resident in the study area who died of any cause aged between 1 month and 5 years. Four controls are chosen for each case from the same area of residence and of approximately the same age. The case-control study will give an estimate of efficacy of the treated nets among children who use them. This can be combined with the coverage estimates from periodic surveys to estimate effectiveness in this target group.

The second study to assess the effect of treated nets on child survival is a birth cohort: all children born in 1998 and 1999 will be enrolled. At enrolment a questionnaire is used to elicit information on birth-weight, mother's age and educational level, twinning, family size, birth order and birth interval. At subsequent routine DSS visits, a further brief questionnaire will be used to gather additional information. It is planned to follow these children until their 5th birthdays. Analysis will compare mortality rates in those using treated nets with those using un- treated nets and those using no nets, allowing for any measured potential confounders.

8.4.4 Effect of treated nets on anaemia and malaria in young children

Three annual cross-sectional surveys to assess the effect of social marketing of treated nets on anaemia will be carried out on a random sample of children aged <2 years from the DSS area, one at baseline before the sale of the nets and then after the first and second year of

implementation. A questionnaire is applied, a physical examination done and a blood sample obtained. The prevalence of anaemia will be compared between users and non-users of treated nets using logistic regression analysis to control for confounding.

To assess the effect of the interventions on malaria and anaemia episodes, a cohort of children aged <5 years residing in the village of Idete is being followed-up and their disease episodes documented, using a passive case-detection system at the village dispensary. Risk factors including treatment-seeking behaviour, household socio-economic status, use of treated nets and mother's education are being assessed by short questionnaires applied through routine DSS visits. Rate ratios of disease episodes (first/only episode) between those using treated nets and those not using them will be compared using Poisson regression to control for confounding. More detailed assessment of the impact of the interventions on malaria episodes is being done within this cohort using a nested case-control study.

8.4.5 Effect of treated nets on anaemia in pregnancy

A cross-sectional survey of pregnant women with rolling recruitment over a period of 12 months is also being carried out using the DSS. The study is designed to determine the prevalence of severe anaemia (Hb <8 g/dl) and to identify major risk factors for this anaemia, including use of treated nets.

8.4.6 Costing of implementation and willingness and ability to pay.

Cost of the implementation to the provider is being assessed. Measures of effectiveness and costs will be combined in a cost-effectiveness analysis (CEA). The costs involved include the initial investment, recurrent oosts, capital costs and opportunity costs. Each type of cost is identified

by associated activities such as brand creation, promotion training, distribution, etc. Willingness and ability to pay were elicited from a sample of respondents within and outside the Phase 1 area, who were asked about household expenditure patterns.

8.4.7 Insecticide resistance: entomological indicators

With increasing use of ITNs at community level, it is possible that the usual night-biting behaviour of the main vector of malaria in the area might change to peak in the early evening and early morning, when few people are in bed. Studies to assess changes in mosquito biting behaviour are therefore carried out every year together with bio-assays to monitor any trend in resistance of wild-caught *An. gambiae* to lambdacyhalothrin or deltamethrin.

8.5 First results

8.5.1 Demography

The estimated mid-year (1997) population ofthe Phase 1 area was 54 061 people living in 10 966 house- holds. Average household size is 4-9 people. Almost half (44%) of the population is aged < 15 years, 16% aged <5 years, and the sex ratio (M:F) is 1:1.02. During 1997 the infant mortality rate was 95/1000 live births (181/1902), and annual mortality in children aged 1-4 years was 14.3/1 000 (98/6859 child-years). In children aged 5-9 years the annual mortality rate was 3.5/1 000 (28/7944 child-years). Total fertility was estimated at 4.7 births/woman.

8.5.2 Willingness and ability to pay

Of those interviewed, 69% (128/1 85) claimed to be willing to pay the price of US$ 5 per net and 88% (163/1 85) were willing to pay US$ 0.4 per net for a net treatment service. Ability to pay assessed by median overall household expenditure in the month prior to the first survey was US$ 74. Excluding expenditure on food, a median of US$ 7 was spent on capital items and US$ 11 was spent on other small items in the previous month. Many households have a bicycle (34%) or radio (11 %). It should be noted that this survey was carried out in the harvest season, when expenditures are at their annual maximum. Further surveys are ongoing.

8.5.3 Sales

Thirty-one net sales agents and 37 mobile net treatment agents were appointed in May 1997 in the 18 villages of the first phase. Among the net agents there were 15 shop owners, 14 village leaders, 1 health worker, and 1 village priest. After 10 months, the priest and 3 village leaders were replaced: they were inactive, mainly owing to their other commitments. During the same period 10 (27%) net treatment agents were no longer active and have been replaced.

The percentage of households with at least 1 net rose from 37% at the end of 1996 to 52% (5913/1 1480) in mid-1 998, by which time 24% (2730/11480) of house- holds had at least 1 treated net and 48% (4323/9040) nets were treated. Of a random sample of families with children aged <5 years, 46 % reported that their children were sleeping under treated nets by April 1998. A total of 22 410 nets and 8072 treatments were sold by the project during the first year. Sales records in the Phase 1 area suggest over 80% nets were sold to residents. As expected, demand peaked after the rains started, when mosquito populations rose dramatically: almost half of the total annual sales were during the months of December and January. Most net treatments were

sold to owners of ordinary untreated nets: 31 % of those who owned ordinary nets had treated these by December 1997 whereas only 13% of *Zuia Mbu* net owners who had bought their nets at least 3 months previously had re- treated their nets by December 1997.

There was a good response to the discount vouchers, with 26% (1687/6489) of net sales to Phase 1 area residents making use of the vouchers. Ongoing surveys will reveal whether the target group, i.e., pregnant women and those with young children, are the principal users of the discounted nets.

8.6 Discussion

Social marketing is a novel and promising approach to promote and supply effective malaria control tools. Its excellent track record for interventions as diverse as ORS, condoms and oral contraceptives suggests that it could perform weil for the large-scale deployment of ITNs (USAID, 1998). So far the KINET project has achieved good coverage in a large highly endemic rural area, reinforcing positive experiences with social marketing of ITNs in the Central African Republic, Zimbabwe and Rwanda (A. Boner and L. Jamu personal communication).

Large-scale ITNs programmes will always be confronted with the problem of finding agents that are both trusted by the community and effective in selling ITNs. The initial choice of net and treatment agents rested largely with village leaders and this resulted in a great diversity of agents selling KINET products. Our early results suggest that commercial retailers often provide a better service to their communities than village leaders. Retailers are used to selling goods and usually have a larger working capital to invest in net and insecticide consignments. Further, they are available at most times of day and easy for potential customers to find. Future expansion is likely to increase the involvement of the private sector.

The issue of whether health facilities should also seil ITNs and treatments remains open, and there are no current Ministry of Health guidelines on this matter. With the gradual introduction of cost-sharing in Tanzania the selling of ITNs could find a natural place in the system but the issue of who should keep commission from the sales deserves careful consideration. An interesting contrast is seen in how sales commission is shared between 2 MCH clinics selling ITNs in the KINET area (see also Fraser-Hurt & Lyimo, 1998). In one clinic all the staff participate in the sales and the TSh 500 commission on each sale is shared. In contrast, in the second clinic the rural medical aide in charge alone seils nets and keeps the commission; this has led to resentment among other staff and to less active promotion on their part.

In the interests of sustainability it is important to develop a system of wholesalers that follows the existing commercial system. This allows reduction of the intensive investment needed when all agents are supplied weekly by the project. The apparently lower cost recovery to the project with wholesalers is more than offset by the lower distribution cost. Once an efficient wholesale network is established monthly supplies to wholesalers should be sufficient and the project can then easily expand to a wider area.

Nets were relatively common in our area before KINET sales started. We therefore started to promote and seil insecticide for net treatment as soon as possible so that existing nets might be treated. Informal feedback from the community suggests that people are often uneasy about bringing their nets out in public, and that they would prefer to treat their nets themselves. We have therefore introduced a home-treatment kit developed in Tanzania (Miller *et al.* 1998), consisting of a single- dose sachet of insecticide packaged with disposable gloves and locally developed instructions. The relatively high cost of this packaging is offset against the problems of deliberate or accidental misuse of larger

quantities of insecticide, and the advantage that our target group prefer the freedom and privacy of treating their nets at home.

We chose to sell pre-treated nets rather than untreated nets despite the argument that this denies the opportunity of educating people at the time of purchase about the difference between a treated and an untreated net and how to treat a net. Pilot studies with the home-treatment kit suggest that people do not need special training to treat their nets. Selling pre-treated nets may mean that some people will not realize that they have bought a treated net, but we feel their lack of knowledge is an issue best tackled through ongoing targeted IEC concerning net treatment. For example, our treatment agents can make use of net sales records in order to make follow-up visits to those who have bought a net 3 months previously. They can then offer advice on malaria prevention and a net treatment service.

Two key issues remain on the promotion agenda. First, the sales are very seasonal, clearly peaking during the time of maximum mosquito densities. No detailed compliance measures are yet available but it is very likely that the net usage follows the same seasonal pattern. Since malaria transmission is perennial in the Kilombero Valley the all year use of ITNs needs to be promoted actively. Secondly, KINET is aiming to reach a large and very dispersed rural population with 2 products: nets, for which existing demand is high, and insecticide, for which existing demand is much lower. Promotion will therefore focus increasingly on re-treatment of existing nets and new distribution channels may have to be developed to facilitate this.

An optimal balance between affordability, equity and full cost-recovery is difficult to achieve. KINET has a current bw level of subsidy on the treated nets (66% cost recovered) and a high level of subsidy on the insecticide (17 % cost recovered). These costs do not cover a minimum programme infrastructure nor the cost of promotion: the project loses a substantial amount of money on every sale. As international demand for

insecticide for net treatment increases it seems likely that cheaper formulations will become available and the cost of insecticide will decrease. Once a stable demand for nets and net treatment exists, retail prices may be increased towards full cost-recovery levels, with subsidies targeted exclusively through the public health sector using vouchers or in other ways.

Although full cost-recovery is an important consideration, there is more to sustainability than full costrecovery alone. Many ITNs projects conducted in the past have not survived the end oftheir projeot status (e.g., Hill, 1991; Premji *etal.,* 1995) despite a certain level of infrastructure and a banked revolving fund. Often procurement and ongoing distribution have been beyond the capacity of the bocal groups. One of the strengths of a public-private mix such as that used by KINET is the inherent sustainability of the private sector distribution system. The remaining issues of procurement and promotion are likely to need special attention at the end of the 'project status' phase. A bow-cost social-marketing support service at district, regional or even national level could provide such inputs. Virtually no other intervention in preventive health is entirely self-supporting: if ITNs programmes are (1) feasible on a large scale and (2) efficient through bw delivery cost per net or per treatment, they should be able to attract sufficient donor support in the context of the Roh Back Malaria initiative.

The question of long-term effect of ITNs on survival in highly endemic areas is important. Since randomized controlled trials are neither feasible nor ethically acceptable, we have chosen observationai studies to compare users of ITNs with non-users, both through a oase- control study and the long-term folbow-up of a birth cohort. Problems remaining include the difficulty of determining use of treated nets and the influence of potential confounders, many of which are difficult to measure. Experience from other areas of health, for example the health impact of smoking or the impact of ORS, suggests that observational

studies can make a useful contribution. However, our results will need careful interpretation. Ideally, such long-term follow- up should be carried out in a number of sites. Other African projects are attempting to do this in Ghana and in Burkina Faso where the population formerly involved in the scientific trials (Binka *et al.,* 1996; Habluetzel *et al.,* 1997) is being folbowed-up for a further 3 years in order to detect a possible delayed increase in mortality in the former intervention group compared to the former control group (F. Binka, personal communication; E. Sanogo, personal communication). A similar study is planned in Western Kenya (P. Phillips-Howard, personal communication).

The KINET project represents an attempt to see to what extent social marketing is a useful tool in the fight against malaria in a rural African setting. Data are being collected on the key issues of cost and effectiveness of ITNs on child survival, but the results are some time away. in the mean time, the information availabie to date suggests that social marketing is a usefui approach for ITNs, being innovative, popular and sufficiently adaptable to address the varied challenges of a malaria control programme in a rural African setting.

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Chapter 9 Introducing insecticide-treated nets in the Kilombero Valley, Tanzania: The relevance of local knowledge and practice for an Information Education and Communication (IEC) campaign

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Abstract

Since 1997, the WHO recommends an integrative strategy to combat malaria including new medicines, vaccines, improvements of health care systems and insecticide treated nets (ITNs). After the successful controlled trials with ITNs in the past decade, large-scale interventions and research now focus on operational issues of distribution and financing. This paper reports about the social science contribution to the development of a social marketing approach in the Kilombero Valley in southern Tanzania in 1996. A combination of qualitative and quantitative methods was employed to investigate local knowledge and practice relating to malaria. The findings show that the biomedical concept of malaria overlaps with several local illness concepts, one of which is called *maleria* and refers to mild malaria. Most respondents linked *maleria* to mosquitoes (76 %) and already used mosquito nets (52 %). Local understandings of severe malaria, however, differed from the biomedical concept and were not linked to malaria and mosquitoes. A social marketing strategy to promote ITNs was developed on the basis of these findings, at the same time reinforcing public health messages and linking them with clearly identifiable products, namely *Zuia Mbu* (prevent mosquitoes) nets and insecticide. The paper concludes that local knowledge and practice is highly relevant for the development of ITNs social marketing strategies.

Keywords: Tanzania, malaria, disease perceptions, local knowledge, vector control, mosquito nets

9.1 Introduction

Since 1997, the WHO recommends an integrative strategy to combat malaria, formulated within the Roll Back Malaria programme (WHO 1999). Such a strategy ranges from developing new medicines, vaccines, improvements of health care systems, to insecticide treated nets (ITNs). In the 1980s and 1990s, controlled trials showed that ITNs reduce morbidity and mortality from malaria (Lengeler 1998). In sub-Saharan Africa, about 6 lives for every 1000 children protected in the age group 1-59 months can be saved every year, if regular and proper use of ITN is guaranteed. In areas where parasites have become increasingly resistant to anti-malarial drugs like chloroquine, where access to health services is limited and medication often inappropriate, ITN technology presents an attractive option that can effectively complement the main malaria control strategy based on early diagnosis and prompt treatment.

Four large-scale trials in The Gambia (D'Alessandro et al.1995), Kenya (Nevill et al. 1996), Ghana (Binka 1997) and Burkina Faso (Habluetzel et al. 1997) have shown the efficacy of ITNs under trial conditions, but more research is needed about the effectiveness of ITNs under real life conditions where social, cultural and economic factors influence routine utilization and regular re-treatment of nets (Lengeler and Snow, 1996). Large-scale programmes and projects are underway, and research is now focusing on operational issues of delivery and distribution ofITNs in a sustainable way.

Over the past decade, research into social, cultural and economic aspects of ITNs (MacCormack & Snow 1986, MacCormack et al. 1989, Aikins et al. 1993, Aikins et al. 1994, Gyapong et al.1996, Marshy et al. 1996, Binka and Adongo 1997, Winch et al. 1997) has resulted in a systematic approach around a set of key topics which influenced subsequent social science studies regarding malaria control in general

and ITNs in particular. The topics identified centred around two main issues:

1. People's perceptions about the causes of malaria including local terms and concepts classifying symptoms relating to malaria, and more specifically information on whether people see a link between mosquitoes and malaria;
2. People's behaviour in mosquito prevention encompassing locally used mosquito control measures, current net use, types of nets preferred in terms of colour, size and shape, current sleeping arrangements, washing of nets (important to know because the insecticides are water soluble) and factors influencing use of mosquito nets, such as disease etiology, socio-economic status, age and gender, affordability and seasonality.

This paper draws on these studies and acknowledges that such issues have to be taken into account, if ITN interventions are to be tailored to local needs and demands. However, much of this research has used the Knowledge, Attitude, Belief and Practice methodology with its implicit opposition of biomedical knowledge versus people's - often erroneous - beliefs and practices. Such research aims to identify gaps in people's knowledge of biomedical facts and barriers to their acceptance of biomedical practices.

In the perspective of this paper biomedical knowledge and practice is a powerful tradition which alleviates disease and suffering. At the same time, it acknowledges that indigenous knowledge and practice on health and illness which is rooted in historically and geographically distinct interpretive traditions deserve respect in their own right. To emphasise this point, the terms "knowledge" and "practice" rather than "perceptions" and "behavior" are used and refer to what people know and think and to what people do.

The aim of this paper is to show how local knowledge and practice was taken into account in the development of the Information, Education and Communication (IEC) strategy of the Kilombero Net Project (KINET), a large-scale ITN programme (Armstrong Schellenberg et al. 1999). The project used a social marketing approach to promote and distribute ITNs to a rural population of 350,000 people.

9.2 Material and Methods

9.2.1 Study area

The study area comprises the Kilombero and Ulanga Districts in the Morogoro Region of southern Tanzania. It lies in the broad flood plain of the Kilombero River. The climate is marked by a rainy season from November to May and a dry season from June to October with annual rainfall ranging between 1200 to 1800mm (Tanner et al. 1991). The area is characterised by intense and perennial *P. falciparum* malaria transmission, with a peak during the rainy season (Tanner et al. 1991, Smith et al.1993).

Most project villages are located along the roads leading to the district headquarters of Ifakara (Kilombero District) and Mahenge (Ulanga District). The district health services comprise village health workers, health posts, dispensaries, health centres and district hospitals. Various types of traditional healers as well as local shops selling pharmaceutical products are also common in the area (Hausmann Muela 2000).

The village populations are characterised by heterogeneity and include ethnic groups such as the Wandamba, Wapogoro, Wambunga and Wahehe. Swahili is the *lingua franca*, but in day-to-day life, people often speak their own languages. Most villagers rely on subsistence farming for their livelihood. Some men earn an additional income as casual labourers and fishermen. Women sell farm produce or their labour to earn some cash.

9.2.2 Study design

This paper discusses the anthropological contribution to the development of a social marketing approach for malaria control using ITN. From July 1996 to June 1997, meetings were held in 18 villages to introduce the project and discuss health problems with a focus on malaria and its prevention. The main aim was to inform about the two KINET products: insecticide-treated nets and sachets of insecticide to retreat the nets. More contextualized information about malaria, its treatment and prevention was collected in an ethnographic study in Katindiuka and Mofu villages in the Kilombero District over a period of 3 months in 1996. A total of 26 focus group discussions and 39 in-depth interviews were conducted. Based on these findings, a semi-structured questionnaire on knowledge and practice was designed. This questionnaire was administered in 4 out of the 18 project villages to a sample of 204 randomly chosen individuals. All interviews were conducted in Swahili by a trained team of village-based fieldworkers. Finally, the qualitative data from the village meetings, the ethnographic study and the village survey were used for the development of promotional materials for an Information Education and Communication (IEC) campaign.

9.3 Results

9.3.1 Local knowledge about febrile illnesses

The term *maleria,* adapted from the biomedical concept "malaria", is widely used in daily language to refer to the common and easily cured type of fever caused by mosquito bites (Table 1). Other terms such as *degedege* (convulsions), *homa kali* (high fever) and *bandama* (splenomegaly) are locally used to refer to conditions that are commonly feared as responsible for childhood deaths. According to the biomedical classification, all these conditions can be related to malaria and may represent different degrees of severity of this illness. The villagers,

however, distinguish between *maleria* as a mild illness and *degedege, homa kali* and *bandama* as life threatening illnesses of different origin particularly among children**.**

In the survey of four villages, 155 (76%) of the respondents out of those interviewed (N=204) attributed *maleria* (the mild form of malaria) to mosquitoes. Some mentioned other causes, such as fever 37 (18%) and stagnant water 12 (6%) in addition to mosquitoes. With regard to malaria and fever, the logical link seems somewhat reversed from a biomedical point of view. The respondents referred to the fact that they notice at home, that a child's body temperature is raised, and when they consult a health facility, they are told the child suffers from malaria. Therefore they say fever causes *maleria*. Concerning severe malaria, 64 (31 %) respondents considered it as a cause of *degedege,* 35 (17 %) persons as a cause of *bandama.* Other mentioned causes for *degedege* were bad spirits 43 (21%) followed by a certain type of moth 26 (13%) [1.] For *bandama* the causation model incorporated accounts of dirty or contaminated blood accumulating in the spleen giving the child very high fever. Not a single respondent related *degedege* or *bandama* to mosquitoes. With regard to *homa kali,* 73 (36%) respondents saw a connection between the illness and mosquitoes.

These data indicate that although people frequently mention mosquitoes as causing *maleria* and correctly emphasise the role of mosquitoes in its transmission, they harbour considerable doubt about the link between malaria as a life threatening disease and mosquitoes.

> "... if these mosquitoes were causing such serious*maleria*, everyone would be dead in the village because people have lived with mosquitoes since they were born and are still surviving, getting bitten by mosquitoes every day during the rain season when mosquitoes bite all the time, while working in the farms, when in the toilet and while sleeping at night." (Middle aged men, group discussion, Mofu)

Table 7 Mild and life threatening "malaria" among children

Swahili term for reported illness condition	Signs and symptoms	Perceived causes	Treatment	Prevention
Degedege (Convulsions)	Raised body temperature -rolled up eyes -twitching -trembling -rigid body -no urine, no stool	Bad spirits Huge butterfly The hospital people say excess malaria causes *degedege*	First aid at home to revive the child -Mother's urine smeared on the child -mixed herbal concoction for the child bath -kerosene applied to the child's body -hospital if the child does not improve	Local protection -Ready made preventive charms worn at 40 days after delivery -herbal preparation administered in early infancy
Homa kali (High fever)	Raised body temperature -body weakness -twitching -vomiting	Mosquitoes Malaria	Antimalarials e.g. chloroquine syrup for infants, tablets antipyretics for children	Antimalarials e.g. chloroquine syrup for infants
Bandama (Enlarged spleen)	Raised body temperature -swollen spleen -yellow stool -pale skin	Not clear Blood contamination	Draining the "dirty blood" from the spleen	Administer *vidonge vya bandama* (tablets for swollen spleen sold in local shops (sulphadoxine pyremethamine)
Maleria	Presence or absence of high body temperature -Shivering & extreme cold- -Headache -Diarrhoea -Vomiting f	Mosquitoes Fever	Antimalarials	Mosquito nets Antimalarials

From a public health perspective, the links between *maleria* and the more serious conditions called *degedege, bandama* and *homa kali* as well as the specifics of the malaria-mosquito link clearly call for further clarification and explanation.

9.3.2 Protective measures for malaria and related illnesses

Most people see *maleria* as a mild illness that is very common, can easily be treated but not prevented. As a consequence, using mosquito nets is thought of as desirable for mosquito nuisance protection but not for *maleria* prevention, as the following quote illustrates:

> *"Maleria* happens like other normal illnesses and nobody can prevent it...the mosquito net is not a solution. One can say a net is a personal protection from mosquito bites, but it cannot protect *maleria*. Those who use nets and those who do not they all suffer from *maleria* the same way." (Middle aged women, group discussion, Katindiuka)

In the quantitative assessment 94 (46%) of the respondents mentioned the use of nets when asked about malaria protection. The other respondents mentioned a range of measures: 69 (34%) said they give their children chloroquine tablets in combination with antipyretics. Another 26 (13%) reported burning scented local herbs to repel mosquitoes and 15 (7%) burn mosquito coils which are considered expensive.

The prevention of complicated forms of malaria follows a different logic. To prevent *degedege,* 102 (50%) respondents mentioned a charm (*hirizi)* prepared by traditional healers to protect small children from bad spirits. Further 69 persons (34%) said they gave their children a herbal concoction like *ngambi* to protect them from various ailments, such as those caused by the "heat" of parents after having sexual intercourse or by attacks from bad spirits. To prevent *bandama,* 33 (16%) respondents give their children *vidonge vya bandama,* a local "brand name" for the antimalarial sulphadoxine/pyrimethamine sold in local shops. From a

public health perspective, the idea that mosquito nets protect against mild malaria should be reinforced and expanded to include the more serious conditions.

9.3.3 Mosquito net ownership and net treatment

In the sample of 204 respondents, 107 (52%) already owned mosquito nets, although not treated ones (see Plates 10 and 11). 55 persons (56%) with children under five had an untreated net compared to 47 persons (44%) without children. 70 respondents (68 %) had bought their nets in shops in Ifakara town, 17 persons (17%) in a village shop and 6 persons (6 %) in the capital Dar es Salaam. 5 respondents (5%) got their nets as a present, 4 persons (4 %) bought them from the district hospital's pharmacy. The reported price for the existing nets ranged between Tsh 1500/- and 9000/-, with a median price of Tsh 3500 (about US $6, 1 US $ = 590 Tsh in 1997).

188 out of the 204 respondents (92%) spontaneously mentioned financial constraints as one of the important reasons for not owning any or owning only few nets. Both men and women claimed that the availability of money in the villages is seasonal and restricted to the time when subsistence produce is sold during the dry season. In the rainy season, when mosquito density is high, people have little cash to spend. This is illustrated by the following quote:

> "It is during the dry season that we have money. In this time, the rice is ready for food, and we also sell some of it for money. But during the rainy season, when mosquitoes are plenty, we don't have any produce to sell for money." (Middle aged men, group discussion, Katindiuka)

Somewhat contradictory evidence comes from the sales figures for ITNs in 1997/98. They reached a peak during the rainy season, namely in December and January, when people claim to face a lack of cash. One can argue, however, that this contradiction can be resolved, if the extreme mosquito density of that period is taken into account. The

above statements would then represent people's perception and economic pattern during a "normal" year. However, owing to an exceptional climatic change, (the El Niño phenomenon) 1997 was not a normal year. People had to change their priorities and to reallocate their resources to respond to this emergency.

Out of the 204 respondents, 121 (59%) had already heard of net treatment, but their personal experience with ITNs was limited: only 7 persons (3%) had treated nets in their households. Two main sources for ITNs and net treatment services were mentioned, namely the pharmacy of the district hospital and a UNICEF project carried out in 1995. 69 respondents (34%) said that they had heard of the necessity to retreat nets. When asked whether they would like to have a treated net, 171 respondents (84%) answered in the affirmative, while 33 (16%) expressed a dislike. Of those who said they would like to have a treated net, 104 (51%) spontaneously mentioned the potential of the insecticide to repel and kill mosquitoes as the main motivation, and 36 (18%) viewed malaria protection as a motivating factor. Related reasons such as repelling and killing of household pests (19; 9%) and good night's sleep (12; 6%) were also cited.

When respondents were presented with an open-ended question for a general opinion on using insecticide in net treatment, 92 of them (45%) shared the opinion that it would reduce the mosquito nuisance. 77 persons (38%) said they could not give their opinion on something they have not seen. 35 people (17%) referred to the fact that the insecticide is poisonous and questioned the safety of ITNs, especially for children.

Most people in the study area were familiar with mosquito nets, and even net treatment was not altogether a new idea. From a public health perspective, it seemed most important to provide more detailed information regarding both the nets and the insecticide.

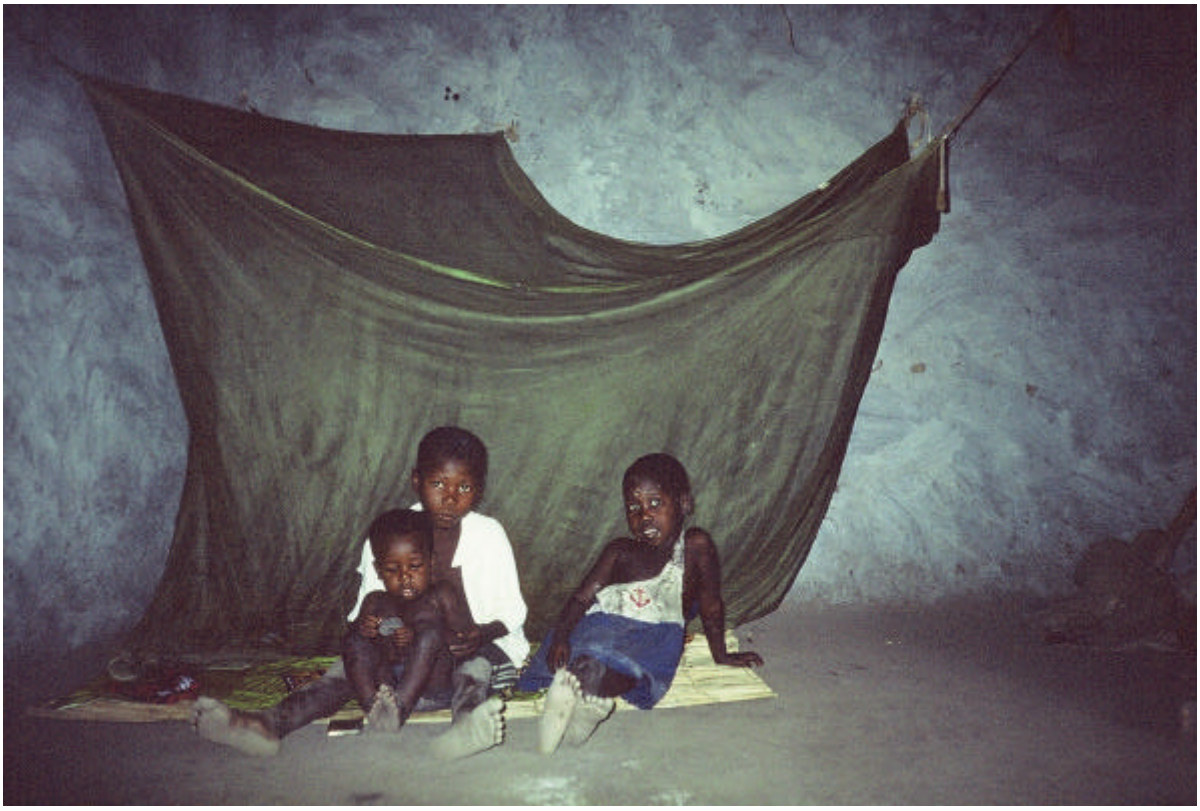

Plate 10 The "new" green coloured Zuia Mbu net. (Photo: H. Minja)

Plate 11 An "old" white net owned by local people (Photo: H. Minja)

9.3.4 Developing an IEC strategy

Based on these findings and ongoing market research, the KINET team developed an Information Education and Communication (IEC) strategy. Its main approach drew on basic principles of social marketing, namely that certain messages should be promoted together with a product carrying an appealing brand name and logo, and that the marketing of the messages and the products should be guided by a consumer orientation and target specific segments of the society (Andreasen 1995).

The two products of KINET project are: 1) insecticide-treated nets tailored in size and colour to local preferences, and 2) sachets containing the dose of insecticide needed for the re-treatment of one net. During focus group discussions, local people selected the phrase *Zuia Mbu* (Swahili for "prevent mosquitoes") as a suitable brand name for both products. The logo was then developed together with an advertising agency in Dar-es-Salaam (Armstrong Schellenberg et al., 1999). The project team made a special effort to link the *Zuia Mbu* products with a number of key messages that integrate community and public health perspectives (see Figure 4).

A local artist was commissioned to visualise the key messages. His paintings were pre-tested in a nearby village, and people's comments helped to clarify misunderstandings. The project then printed a revised version of the paintings with explanatory texts in the form of posters and a leaflet. These print media summarise the key messages attached to *Zuia Mbu* products. The products and the attached visual and verbal messages were then promoted in a variety of contexts targeting different segments of the population, such as mothers and fathers of pre-school children, mothers attending growth monitoring and vaccination clinics and pregnant women attending antenatal clinics.

Figure 4 Key messages of the KINET project IEC Campaign

- Malaria causes *degedege, bandama* and *homa kali* (*malaria husababisha degedege, bandama na homa kali)*
- Malaria kills*(malaria huua)*
- Use a treated mosquito net *(tumia chandarua chenye dawa).*
- A good sleep without worries*(usingizi mtamu bila wasiwasi).*
- Use Zuia Mbu for protection (*Jikinge kwa chandarua chenye dawa ya Zuia Mbu)*.
- Malaria is transmitted by mosquitoes which bite late at night*(mbu wanaosababisha malaria huuma usiku wa manane)*.
- Prevention is better than cure *(kinga ni bora kuliko tiba)*.
- Zuia Mbu repels and kills mosquitoes*(dawa ya Zuia Mbu hufukuza na kuua mbu).*
- Re-treat any net with Zuia Mbu insecticide every 3 months *(kila baada ya miezi mitatu chandarua chochote weka dawa ya Zuia Mbu).*
- Zuia Mbu is safe for children and adults *(dawa ya Zuia Mbu ni salama kwa watoto na wakubwa).*

One poster addresses the local terminology for malaria and related illnesses (Plate 12). As discussed above, people in the study area regarded *maleria* as a mild and common disease, whereas other conditions (*degedege, homa kali* and *bandama*) were seen as life threatening but not related to *maleria*. To clarify this issue from a public health perspective, the message illustrates that malaria is the umbrella term covering *degedege, homa kali* and *bandama* and stresses that malaria kills.

The second concern was to build on practical and immediate needs related to mosquito nuisance, reinforcing the existing awareness of the malaria-mosquito link and creating a new link with the KINET products. The messages introduce the brand name and logo *Zuia Mbu* for both treated nets and the insecticide and emphasise the importance of sleeping under a treated net.

Related to these main concerns, other posters highlight the benefit of having a good sleep without worries, point out the peak hour for malaria transmitting mosquitoes and the repellent and killing power of the *Zuia Mbu* insecticide (see Plate 9). They reinforce the idea that nets offer protection, that prevention is better than cure, explain how ITNs work, emphasise their safety for children an adults and remind people to retreat any net with *Zuia Mbu* insecticide every three months.

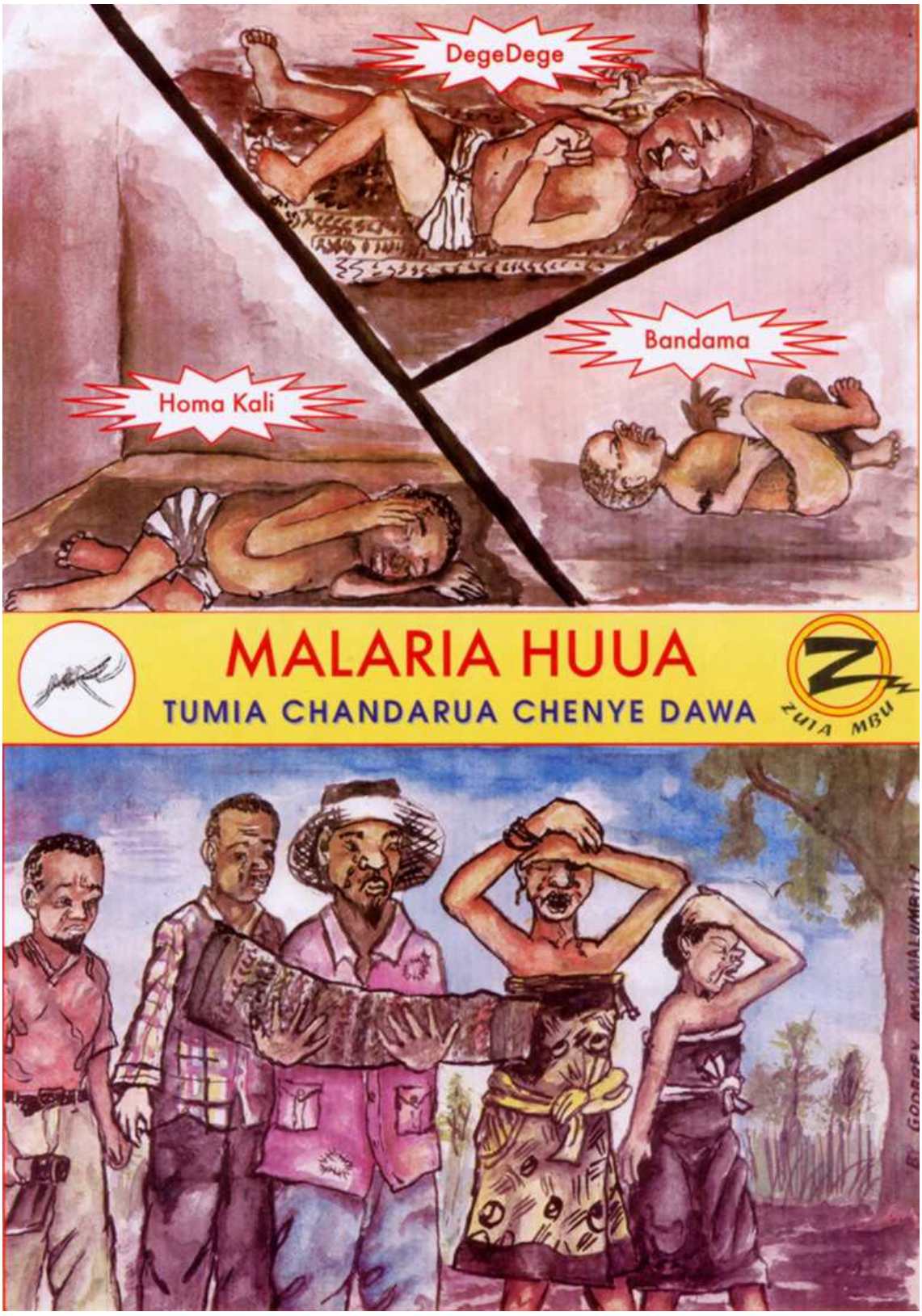

Plate 12 Poster 2 of the Zuia Mbu IEC campaign

9.4 Discussion

This paper emphasises the relevance of local knowledge and practice on malaria and its prevention for the design of culturally appropriate and effective interventions. It documents an approach in which observations from village meetings, an ethnographic study and a village survey have been incorporated into an IEC strategy following basic principles of social marketing. The main aim of this approach was to integrate public health perspectives and community perspectives into a coherent promotional strategy. Such an approach becomes particularly important if ITNs are to be introduced to large populations not under ideal conditions of a trial but under real life conditions of a programme.

The qualitative data have shown that, already prior to the KINET project, people in the study area had integrated ideas derived from biomedicine into their local knowledge and practice. This is an unexpected finding. It can be explained by the fact that, especially after Independence in 1961, Tanzanians have been exposed to many health education campaigns, for instance the famous *Mtu ni Afya* (Man is Health) mass education campaign organised by the government to improve the villagers health in the 1970's with a focus on widespread diseases like malaria (Hall, 1978). Moreover, many research projects on malaria have been carried out in the Kilombero Valley (Kilombero Malaria Project, 1992). In this process, villagers have taken up biomedical concepts and reinterpreted them in the light of their own experience and logic.

Respondents use the term *maleria,* for instance, to refer to the mild form of malaria, which is considered as a common illness forming part of everyday life for individuals, families and communities at large, while other terms *(degedege, bandama, homa kali)* are used for conditions perceived as life threatening among children which are - from a biomedical perspective - often caused by severe malaria. Similar terminological differences have been reported in Ifakara town

(Hausmann Muela et al 1998, Hausmann Muela 2000), in another setting of Tanzania (Winch et al. 1994) and in Kenya (Mwenesi 1993). In Bagamoyo, a coastal area of Tanzania, the local term *homa* was used to refer to both fever as a symptom, to febrile illnesses or to illnesses in general (Winch et al. 1996). Moreover, two major groups of *homa* illnesses are recognised in that area. The first group consists of severe and not easily treated illnesses referred to as the "out-of-the-ordinary" fevers *(homa zisizo za kawaida).* The second group comprises of mild illnesses and is described as "ordinary-everyday" fevers *(homa za kawaida)* which either go away on their own without treatment or can easily be cured. "Malaria" is included in the latter category. Similar results are also reported in Kilifi district, Kenya where the mild malaria is understood to be related to mosquitoes whereas conditions such as convulsions, splenomegaly and anaemia, though acknowledged as serious childhood illnesses, are not recognised as possible consequences of malaria (Mwenesi 1993, Mwenesi et al. 1995).

This reinterpretation has important implications for treatment and also influences preventive practices. The belief in the supernatural causation of *degedege,* for instance, contributes to a notion of defence mechanism referred to as *kinga* (protection). The individual can protect himself or herself against an attack from outside by wearing a *kinga,* for example *hirizi* (amulets). Traditional healers and knowledgeable individuals prepare *hirizi* for young children who are regarded especially vulnerable to attacks from witchcraft and bad spirits. In the quantitative survey 50% of respondents preferred *hirizi* for *degedege* protection. In this context, the promotion of ITNs as effective preventive tool may not make much sense from the point of view of the villagers.

Moreover, while many people have heard that malaria is transmitted by mosquito bites, considerable doubts about the link between mosquitoes and malaria remain. The doubts are often expressed in the form of logical premises based on practical experiences. There are, for instance,

many mosquitoes in the area, especially during the rainy season. If mosquitoes were causing serious malaria, everyone - and especially young children whose blood constitution is still weak - would be dead. Similarly, people notice that malaria attacks people sleeping under nets in a similar way to those who do not. It follows therefore: a) the illness is normal, and b) cannot be prevented. Such statements were made spontaneously by different people in different situations. It is difficult to estimate how many people would agree with such statements, but the quantitative data show a rather weak link between mosquitoes and severe forms of malaria from people's points of view.

The above logic can be interpreted as people's attempts to understand the concept of risk reduction, and this has important implications for the promotion of ITN as an effective measure for control of malaria. Unfortunately, ITNs only reduce the number of malaria episodes by about 50%; but they do not prevent them altogether. Since malaria is such a common disease (every child living in highly endemic areas will have on average at least two episodes per year) the number of cases will remain high even after perfect ITN use. The villagers are less interested in imperfect disease control tools such as ITNs and are more convinced by health tools that confer full benefits in terms of risk reduction and they anticipate that health experts (doctors, scientists, researchers and managers) who are knowledgeable and powerful outsiders to provide perfect solutions to the problem of malaria. It is difficult for the lay people to understand the differences between the benefits from vaccines such as polio vaccination which confer very high protection levels (near 100%), compared to ITNs which are cost effective but reduce the risk by only half.

The findings that (1) 52% of the respondents already had nets to protect themselves from mosquito nuisance biting, (2) two thirds of them have heard of insecticide-treated nets and (3) 84% would like to have such a net, were most encouraging. The data show that the use of nets was not

a new idea in this community, however, what was required, was improved availability, accessibility and promotion of net treatment and re-treatment.

Consequently, the social marketing strategy was built on the existing knowledge and practices. It reinforced the correct interpretation of public health messages and linked them closely with the two products to be promoted, namely the ITNs and the insecticide sachets. The strategy also focused on a set of key messages that were passed on in verbal and visual form, in face-to-face interactions and mass campaigns, to different segments of the communities in the Kilombero Valley. Building on these basic principles of social marketing, a coherent IEC campaign was developed that integrated the individual and community perspectives with the public health perspective.

Chapter 10 Acquisition and use of insecticide-treated nets in Kilombero Valley, southern Tanzania: Dynamic aspects of knowledge, practice and communication

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Abstract

This paper reports the approach and findings of ethnographic research carried out as part of an ITN intervention in the Kilombero Valley of Southeast Tanzania. It draws on the model of Mundy and Compton (1995) for studying the interface between indigenous and exogenous knowledge and communication systems. A modified version of this model was developed and applied to investigate interactions between malaria related knowledge and practice which already existed in this particular locality prior to the intervention and biomedical knowledge and practice brought there by the project. Four main lessons have been learnt: 1) Not just IEC and launching campaigns at the beginning of an ITN project but an on-going flow of information between the project and villagers is needed to make an intervention sustainable. 2) Ethnographic monitoring helps to identify factors influencing the acquisition and re-treatment of ITNs and to feed this information back into the project. 3) Village-based project fieldworkers, even if recruited for other purposes, are bound to become a channel of information between the project and the villagers and should be trained accordingly. 4) MCH clinic staff not only transmit ITN technology from the project to the villagers but are a social force acting upon women. In more general terms, the methodology suggested in this paper enables researchers to investigate social and cultural aspects of the effectiveness of ITN interventions from a dynamic rather than a static perspective.

Keywords: Tanzania, malaria control, ITN technology, interface of local and biomedical knowledge and practice

10.1 Introduction

Malaria continues to be a major threat to life, especially in Sub-Saharan Africa, where 90 percent of deaths from malaria occur. Malaria directly accounts for one in five childhood deaths in Africa and contributes indirectly to illness and death from respiratory infections, diarrhoeal disease and malnutrition (WHO 1999:49). Malaria control calls for integrated strategies combining the development of new medicines, the search for vaccines, the improvement of health services and insecticide treated nets (ITNs).

Several controlled trials carried out in Africa have shown that ITNs are a promising tool for malaria control (Lengeler 1998). ITNs reduce clinical malaria episodes by 48 percent. About 6 lives out of every 1000 children protected in the age group 1-59 months can be saved every year, if proper use of ITNs is guaranteed. Efficacy of ITNs, defined as the impact under ideal trail conditions, is well established.

Much less is known about effectiveness under real life conditions. For epidemiologists, for instance, it is important to assess whether the impact on overall mortality that is measured in trials can be maintained over a longer period of time (Lengeler and Snow 1996). Health planners need more data on operational issues regarding effectiveness, for instance on the development of sustainable delivery and distribution systems for ITNs (Tropical Disease Research 1997, WHO 1999). From an anthropological perspective, more research is required on social and cultural aspects of effectiveness, that is on what people think and do in response to ITN interventions and how they interact with one another on the household level as well as on the community and the project level and across these levels. Of particular interest are issues concerning 1) the acquisition of ITNs, 2) the correct and regular use of ITNs, and 3) the regular re-treatment of nets with insecticide (Feilden 1996).

Until now, many social scientists concentrated on people's perceptions of malaria including people's understandings of the mosquito-malaria link and on the influence of this knowledge on the acquisition and use of ITNs. They reported, for instance, that protection from nuisance biting is often a more important reason for using a mosquito net than fear of malaria (MacCormack et al. 1989; Njunwa et al. 1991; Aikins et al. 1994; Gyapong et al. 1996). Especially with regard to severe forms of malaria, people may not see a link between the illness and mosquitoes. Different communities along the coast of East Africa, for instance, acknowledge conditions like convulsions, anaemia and splenomegaly as serious childhood illnesses but do not interpret them as related to malaria and caused by mosquito bites (Mwenesi 1993; Makemba et al. 1996; Winch et al. 1996). Similar findings have been reported from the study area (Hausmann Muela 2000; Minja et al. 2001).

Much of this research has been guided by a public health perspective. The focus was on "traditional" beliefs and practices that had been handed down from one generation to the next, and on their effect as a barrier to accepting ITN interventions. In this perspective, beliefs and practices are seen as forming a static system. It is expected that anthropologists can elicit and record them, for instance in surveys on Knowledge, Attitudes, Beliefs and Practices (KABP). The results of such surveys would then be used to formulate Information, Education and Communication (IEC) strategies to modify people's behaviour.

Research in our study area, however, has shown that in addition to traditional notions, for instance about severe forms of malaria and their proper treatment, people in southern Tanzania have been exposed to biomedical knowledge for quite some time (Hausmann 2000). In the course of this exposure, they created notions like *maleria* and integrated them into their understandings of what in biomedical terms is called malaria (Minja et al. 2001). Also, the idea of using mosquito nets and even net treatment is not new in this area. 46 percent of the respondents

in a village study (N=204) mentioned the use of mosquito nets when asked about malaria protection, and 52 percent actually owned untreated nets. 59 percent had already heard of net treatment, but only a few people (3 percent) owned an ITN.

Rather than focusing on how people construct syncretist notions during the health care seeking process (Hausmann 2000), this study concentrates on the interface between "traditional" and biomedical knowledge in an ITN intervention. Since this study was carried out as part of an intervention with the explicit aim to promote and distribute ITN technology, it provided the unique opportunity to carry out ethnographic research not just of the results, but the actual process of interaction between people's views and practices and biomedical knowledge and practice. To examine this process, it drew on investigations into the cultural dimension of development (Warren et al. 1995), particularly on a model for the study of the interface between different types of knowledge and communication systems (Mundy and Compton 1995). This model arranges knowledge systems and communication systems in a matrix that contrasts both exogenous and indigenous types of each system.

Table 8 Interface between knowledge and communication systems (Source: Mundy and Compton 1995:118)

Communication systems	Knowledge systems	
	Exogenous	Indigenous
Exogenous	A. Technology transfer	C. Indigenous knowledge-based development
Indigenous	B. Diffusion; co-opting of traditional media	D. Cultural continuity and change

Quadrant A is the focus of most research in advertising and communication. The underlying assumption, of course, is that

technological knowledge brought from outside is clearly superior to indigenous knowledge and should be communicated through channels over which the exogenous agency has control. Favourite communication channels are mass media like radio, television, newspapers or magazines, private organisations and government institutions such as schools, hospitals and extension services.

Quadrant D refers to the domain of indigenous knowledge and communication mainly studied by anthropologists, although not necessarily under these keywords and often as part of ethnographic studies devoted to other topics. Such studies have shown that indigenous knowledge, and hence information about it, has not only stable but also dynamic components, such as innovations brought from outside or created locally. Information often travels far, both in distance and time, and is transmitted either orally or through practice, from person to person or through networks.

In *Quadrant C*, indigenous knowledge is taken up and spread through exogenous channels. Little is published on this type of information flow, although it carries great potential. Recent research on indigenous knowledge and farming systems, for instance, incorporates and disseminates what people know about their environment.

Quadrant B stands for the transmission of exogenous knowledge through indigenous communication channels. Especially the use of organised channels and folk media like local theatre groups staging plays has become rather popular, for instance using *wayang* puppet plays to spread family planning messages in Indonesia.

In the definition of Mundy and Compton (1995), the main feature distinguishing indigenous from exogenous information is not the origin of a given message or skill, but its acceptance and communication to the next generation within the local community. It is certainly true that the term "indigenous" in its literal sense carries an implication which is hardly

born out by evidence, namely that knowledge available at a given point in time has originated in this particular locality. Indigenous knowledge is an ambiguous topic and exceedingly difficult to define in our contemporary world (Semali and Kincheloe 1999). Rather than re-interpreting the term "indigenous", however, we prefer to distinguish between knowledge which existed in the locality prior to the ITN intervention and knowledge brought into the area by the intervention. In much of the current literature, the former is called "local", the latter "global" knowledge (Sillitoe 1998). To be more precise, we distinguish between "local knowledge" and "project knowledge".

Moreover, unlike Mundy and Compton's model which explicitly focus on knowledge in the sense of cognition, our study sees knowledge as closely interrelated with practice. Many anthropological studies have shown that people, in certain situations, are able to verbalise what they know and think, in other cases, they are unable to put their knowledge into words: it is implicit, tacit or embedded in what they do, in their day-to-day practice. Moreover, people may know something but not act accordingly. In fact, knowledge itself can be seen as generated in and communicated through interpretive practices (see Good 1994). Because of these close and complex links, anthropologists hardly investigate knowledge without taking practice into account.

Based on these critical reflections, our study suggests a modified version of Mundy and Compton's typology for a systematic inquiry into the cultural dynamics of an ITN intervention. It argues that this typology and the ethnograpic methods used to apply it in the field can contribute to a better understanding of the social and cultural aspects of effectiveness.

10.2 Study setting

The study area comprises the Kilombero and Ulanga Districts in Morogoro Region in Southeast Tanzania (see Fig. 2 and 3). There is a

marked climatic difference between the rainy season from November to May and the dry season from June to October; the annual rainfall ranges from 1200 to 1800 mm (Tanner et al. 1991). There is intense and perennial *P. falciparum* malaria transmission with a peak during the rainy season (Tanner et al. 1991; Smith et al. 1993).

The district headquarters Ifakara (Kilombero District) and Mahenge (Ulanga District) have developed into small rural towns. District health services comprise hospitals, health centres, dispensaries, health posts and village health workers. Various types of traditional healers as well as local shops selling pharmaceutical products are also popular in the area.

Villages are characterised by ethnic heterogeneity including groups like the Wabunga, Wandamba, Wapogoro, Wahehe, Wabena, Wanyakyusa and Wapangwa. In some cases, ethnic heterogeneity resulted from resettlement in newly formed, communal villages called *vijiji vya ujamaa* (Ujamaa villages) organised by the Tanzanian government in the early 1970s. Other villages have existed for a longer time; their population became mixed due to "natural" mobility and migration. According to Alilio and Tembele (1994) no particular tribe is indigenous to Kilombero District. Those called indigenous - Wambunga, Wandamba and Wapogoro - arrived in the early part of the 19th century from Malawi and the Southern part of Tanzania. Other tribes came to the district at the beginning of this century, for instance the Wasagara, Wahehe and Wabena.

Most villagers rely on subsistence farming of rice, maize and cassava for their livelihood. A socio-economic survey estimated that around 60% of the households of Kilombero District produce rice and maize crops below subsistence levels (KVTC 1993). Some men earn an additional income as casual labourers, petty traders and fishermen. Women sell farm produce, local beer or their labour to earn some cash. Most houses

are built with mud walls and thatched roofs; about one third have brick walls and corrugated iron roofs (Armstrong Schellenberg et al. 1999).

10.3 Study design

This study formed part of the Kilombero Treated Net Project (KINET), the second large-scale ITN program for malaria control in Africa (Armstrong Schellenberg et al.1999) carried out from July 1996 to June 2000. The project developed a social marketing strategy to promote and distribute ITNs and insecticide for net treatment to about 420 000 people living in the Kilombero and Ulanga Districts. Over a period of three years, the project sold more than 65,000 ITNs and 25,000 net treatment kits, resulting in a coverage level of 20% in July/August 1999 (dry season) for children under 5. The retail prices were set at approx. US$ 5.0 for treated nets and approx. US$ 0.42 for the insecticide.

The social science component of KINET was carried out in two stages which can be characterised as formative research (July 1996 to June 1997) and ethnographic monitoring (July 1997 to March 1999). Formative research began with meetings in 18 villages to introduce the project, to discuss health problems with a focus on malaria and its prevention and to explore people's views about the two products, that is the insecticide treated nets and the insecticide kits for home net (re)-treatment. To follow up on some of these issues in more depth, an ethnographic study was carried out in two villages (Mofu and Katiandiuka) over a period of 3 months. In the course of this sub-study, 26 focus group discussions and 39 in-depth interviews were conducted. Based on these findings, a semi-structured questionnaire was designed. This questionnaire was administered in 4 project villages to a sample of 204 randomly chosen individuals. All interviews were conducted in Swahili by a trained team of village-based fieldworkers.

The second stage, the ethnographic monitoring, concentrated on one village. It aimed to collect process information on the acquisition and

use of ITNs from villagers' points of view. Mchombe is a big village with a church, a railway station, two primary schools, a government dispensary, a mission dispensary, various shops and a market. According to the Demographic Surveillance System set up by the project, Mchombe had a population of 6600 in 1997. The village was divided into eight government administrative units called *vitongoji* (sub-villages). Ethnographic monitoring focused on a hamlet called Lukolongo. This hamlet had a population of about 800 people and was more rural in character than the central neighbourhoods with homesteads scattered over a large area. After a census, 150 households were selected for a first interview from November 1997 to January 1998 to establish a social profile and to examine whether the households owned mosquito nets. Based on these findings, 30 households were selected for a follow up study of compliance with project services over one year. The households were revisited in August 1998 and in February 1999. The interviews were complemented by participant observation.

10.4 A modified version of Mundy and Compton's typology

The following discussion examines each quadrant of the typology separately. A systematic overview by quadrant summarises the main points (see Table 9).

10.4.1 Quadrant A: The transfer of ITNs technology

The KINET project aimed at a large-scale implementation of ITNs in two districts of southern Tanzania, based on available technological knowledge and the efficacy estimates demonstrated in controlled field trials elsewhere in Africa. The scientific staff knew, for instance, that under trial conditions, ITNs have a potential to reduce malaria-associated morbidity and mortality among children under five years.

They further recognised the need to assess the performance of an ITN intervention under real life conditions.

The technological knowledge to be transferred comprised information about the disease malaria, sustained use of ITNs and the insecticide for net treatment and re-treatment. The project also emphasised the late-night biting pattern of malaria-transmitting mosquitoes, which provides the link between use of ITNs and their potential for malaria prevention.

Project staff identified organised communication channels, namely health clinics, primary schools, and administrative structures such as village governments, which link the districts with the villages. Village health centres, especially mother-and-child health (MCH) clinics played an important role during the IEC campaign and the introduction of ITN vouchers for pregnant women and mothers of young children (Armstrong Schellenberg et al. 1999).

The project team set up its own organisational structures including a Demographic Surveillance System (DSS) to measure the impact of ITN on child survival (Armstrong Schellenberg et al. 1999). For the DSS, the project recruited 21 fieldworkers and 5 supervisors living in the villages under surveillance. The DSS staff was not intended to disseminate information about the project but to collect data on pregnancies, births, deaths, and migration patterns in a regular census of all households.

The second organisational structure consisted of a network of net sales agents and mobile net treatment agents who were trained in the provision of ITNs and insecticide kits for net (re-) treatment services. The former were mainly local shop owners (see Plate 1), the latter village people who travelled on project bicycles from house to house, also to scattered homesteads (see Plate 3).

Table 9 Overview of knowledge and communication types within the KINET project

Communication	Knowledge and Practice	
	Project	Local
Project	Quadrant A. The transfer of ITN technology Technological knowledge about efficacy and safety of ITNs from previous trials Institutionally organised communication channels (e.g. health service, schools) and mass media (posters, leaflet, billboards) Project structure: Demographic Surveillance System and network of sales agents	Quadrant C Building on indigenous knowledge Recording not only knowledge people have but also knowledge people seek about malaria and its prevention Developing IEC campaign combining public health and villagers' perspectives Selecting locally used phrase for brand name and logo in social marketing of products and services
Local	Quadrant B. Disseminating knowledge through local leaders and public events Local leaders including members of village government, shop keepers, school teachers Public events like village meetings, launching parties, local theatre groups, soccer tournaments	Quadrant D. Continuity and change Local reinterpretations of biomedical knowledge (e.g. *malɛria*) Village-based DSS field workers and MCH staff as channels of information Differences in net use between residents and recent immigrants Patterns of buying and re-treating nets

10.4.2 Quadrant C: Building on people's knowledge and practice

The principal aim of the formative research was the identification of people's notions about malaria and its prevention which would be useful for the development of an IEC campaign, as reported in more detail elsewhere (Minja et al. 2001). An important insight of this research was that people not only *have* knowledge, they also *seek* knowledge about malaria and its prevention. Drawing on this insight, the project developed a coherent IEC strategy promoting the key public health messages while addressing questions raised by the people regarding malaria, mosquitoes and treated mosquito nets.

Moreover, the local phrase *Zuia Mbu* (Swahili for "prevent mosquitoes") became the brand name and the logo both for treated nets and insecticide treatment services from the project. It appeared in all promotional materials designed by the project and was thus disseminated to other villagers. The IEC campaign relied on project and government channels (Quadrant A), namely village-based and mobile net treatment agents and DSS fieldworkers, primary schools and health clinics, as well as on local channels (Quadrant B) like public meetings in the villages, shopkeepers, theatre groups.

10.4.3 Quadrant B: Disseminating knowledge through local leaders and public events

KINET systematically used local communication channels to distribute knowledge about its products and services. It was already mentioned that meetings were held in 18 villages to introduce the project. The meetings were organised in the form of open discussions between the project team and the village leaders. The themes were designed to sensitise the village leaders to discuss their health problems focusing on malaria, ways to prevent malaria and issues on how to get ITNs to the villagers in a sustainable way. Based on the findings from the formative and the market

research the project embarked on a systematic campaign to launch its products and services using popular communication channels. The treated nets and the insecticide treatment services were launched in two large villages during May 1997. The launching ceremony included a wide range of activities such as local theatre groups, songs, a raffle, soccer tournaments, and speeches of community and project representatives.

10.4.4 Quadrant D: Villagers' responses to the intervention

Ethnographic monitoring in a specific locality, namely Lukolongo hamlet of Mchombe village, allowed to document villagers' responses to the intervention from November 1997 to February 1999.

Communication channels

The first question, of course was, whether and how information about the project reached the villagers. Six months after the launching of project products and services, nearly all respondents (97 percent) who were mainly heads of households had heard about them from different sources (N=150). Most people (70 percent) mentioned the village-based fieldworkers responsible for the DSS as the main source of information. The remaining 30 percent mentioned various sources including the public meetings conducted by the project team (11 percent), village based sales agents (7 percent), mother-and-child health clinics (5 percent), neighbours (4 percent) and friends (3 percent).

Mosquito net acquisition

Another important issue concerns acquisition patterns. In our study sample (N=150) people were slow in acquiring ITNs. By November 1997, six months

after the launching ceremony, only 6 households had either bought an ITN or used project services to treat a mosquito net they already owned. The most common reasons mentioned were lack of money and low mosquito density. A few people reasoned that the nets were donated by Europeans, and hoped the ITNs would be given freely if they refused to buy them. In December 1997, 9 households and in January 1998, 28 households had purchased project nets or re-treatment services.

This does not mean that people did not have mosquito nets. The majority of the households already owned a net (86 percent), but most nets were untreated (67 percent) bought in local shops and markets before the KINET project started. The issue thus was not just whether people buy an ITN, but also whether they treat and re-treat the nets they already own.

Net ownership of old residents and recent immigrants

A closer look at net-ownership brought to light that in most households who had acquired an ITN, either one parent or both were not really "indigenous" in the strict sense of the term; they had been born elsewhere and migrated to the Kilombero Valley.[1] As shown in Table 10, ownership of ITNs was higher in immigrant households (24 compared to 10 percent). The proportion was reverse for households not owning a net (10 compared to 21 percent).

[1] In the study sample of 150 households in Lukolongo hamlet, 98 households comprised members who had been born outside the village. Many of these migrants, especially from Mbeya in southwestern Tanzania, had been attracted by the availability of fertile farmland and job opportunities during the building of the TAZARA railroad.

Table 10 Net ownership according to migration status by January 1998 (N=150)

Place of origin		Net ownership		
		Untreated nets	ITNs	No net
Born in the village	(n=52)	36 (69%)	5 (10%)	11 (21%)
Born elsewhere	(n=98)	65 (66%)	23 (24%)	10 (10%)
Total	(n=150)	101 (67%)	28 (19%)	21 (14%)

Source: Field research 1996-1999

Due to the small number of respondents no statistical inferences were made. Nevertheless, the data indicate a trend, which has been also observed in a broader study, namely that households of immigrants tend to have more treated nets (Abdulla, pers.com.)

Reasons for getting KINET products and services

What were the reasons people gave for buying KINET products and services? A first group reported that there was a pregnant woman in the household (N=10) and that she had been reminded now and again at the health clinic to have an ITN when the new baby arrives (see Table 11). The same was true for one woman in this group who had already given birth. Another group (N=10) expressed the added value of a treated as compared to an untreated net in terms of size, colour, shape and quality of the product, but only two mentioned the advantage of the insecticide. The active promotion of the project attracted several new buyers (N=6). Only one respondent referred to "mosquito fever" as a motivating reason for acquiring an ITN.

Table 11 Reasons for acquiring ITNs (November 1997 to January 1998)

Reasons	Number
Pregnancy, reminder at the clinic	10
Size, colour, shape, quality	10
Active project promotion	6
Advice of friend	1
Fear of mosquito fever	1
Total	28

Source: Field research 1996-1999

What is surprising is that none of the main reasons mentioned in the interviews mirrors what people most discussed in everyday life, namely their concern regarding exceptionally heavy rains which started at the end of November 1997. Villagers are used to have short rains at that time of the year. Heavy rains usually set in from March to May, and people associate these heavy rains with high mosquito density, an observation which is confirmed by entomological research in the area (Smith et al. 1993:56). In 1997 - due to the El-Niño phenomenon - heavy rains set in at the end of November. Seeing these heavy rains, people expected a rapid increase in mosquito density. They thus had to change their household priorities. In fact, their worries and concern shifted from limited cash, a common problem at this time of the year, to "a war against mosquitoes". As a farmer explained it:

> "Use of mosquito nets is determined by the season; that is why, during the wet season, everyone with a mosquito net uses it. Rain is the source of mosquitoes, and for this particular year - because of the heavy rains - people have started preparing themselves. They know from the beginning of December, large numbers of mosquitoes will appear in the village, and it will be a time for war against mosquitoes" *(wakati wa vita dhidi ya mbu)*.

This reasoning linking heavy rains and mosquitoes may partly account for the increase in the purchase of ITNs at the end of 1997.

Follow up study on acquisition, use and re-treatment of ITNs

To examine the acquisition, use and re-treatment of ITNs over an extended period of time, an in-depth study was carried out in the following two groups: a) households who had acquired an ITN or used the net-treatment services by January 1998, and b) households who did not have any net and therefore had not used the net-treatment services by that date.

The original plan was to involve 100 participants, that is 50/50 in each group. However, only 28 and 21 households, respectively, fulfilled these criteria by January 1998 (see Table 12). During the second visit in August 1998, only 15/15 could be interviewed again; the others had temporarily moved to their farms and were difficult to locate (see Plates 13 and 14). By January 1999, even fewer households could be followed up (11/9) because some had moved away for good and others had dissolved due to the death of one of the parents. These difficulties in tracing households over a period of one year indicate high mobility, a fact which has also been noted in other parts of the project area.

As a result of these difficulties, the number of households in the follow up study is small. Nevertheless, the interviews with these few households provided important insights. They helped to pick up trends which could then be discussed with the village-based DSS fieldworkers, the sales agents and other actors involved in the implementation process. This, in turn, allowed the project team "to keep an ear on the ground", to respond to concerns and worries voiced by the villagers and to continuously improve the intervention.

Plate 13 People on the move to the field *(shamba*)(Photo: H. Minja)

Plate 14 A typical *shamba*-house (Photo: S. Abdullah)

What happened in the first group, that is in households who had positively responded to the project and had purchased its products or services by January 1998? As shown in Table 12, only two had continued to do so until the second visit in August. They had re-treated the nets and actually used them, not to prevent malaria but to kill other insects. The other respondents explained that they were either waiting for the mosquito season (N=6), were worried about the insecticide (N=4) or that the ITN was not in the household (N=3). The situation was similar during the third visit in February 1999. By then three households had re-treated the nets, but only one of them had used the net.

Table 12 Follow up of people who owned an ITN by January 1998

Explanation	August 1998 (N=15)	February 1999 (N=11)
Re-treated and in use because it kills other insects	2	1
Re-treated but not in use, packed to be taken by the husband to the river	-	1
Re-treated but not in use, waiting for mosquito season	-	1
Not re-treated and not in use, waiting for mosquito season	6	3
Not re-treated and not in use for worries about insecticide	4	3
Not re-treated and not in use because the net was not in the household	3	2

Source: Field research 1996-1999

These data indicate that after a first, positive response, compliance may become a problem, both in terms of regular re-treatment and regular use. People may not see a need to re-treat and/or use a net except during periods of heavy rains when there are plenty of mosquitoes. Some voice a concern about the safety of the insecticide, and others have not kept the net in the household.

Such tables, of course, cannot capture the reasoning of individual persons over a period of time. Case studies are better suited for this purpose, as the following excerpts of interviews with a teacher illustrate. When we first met him in November 1997, he owned an untreated mosquito net.

I "Have you heard about treated mosquito nets?"

R "Yes, I heard about them during the meeting at the school, and there, remember, I had many questions and ideas because we fail to understand the goal of this project. They say they are going to sell the nets but maybe, given the ability and the environment of the people, their financial capability is limited. Now, for example, in my household, I need four nets, therefore I have to part with TSh 12,000. The price per net is not so high, but my income is low; maybe the project could come up with other strategies for those with low incomes. These strategies could be different using different criteria for different groups, and this could probably help to bring costs down. What is troubling is the cost. For sure these nets are good, taking into consideration that the ITNs are durable and have a nice colour...I talked with my friend who had bought an ITN, and he made me jealous... You know, what I ask myself is, why a man like him and his family should sleep peacefully, while my family and I are eaten by mosquitoes? ..."

I "You already own a mosquito net which you bought in a local shop. Did you get it treated?"

R "No, I have not. Had it been one of the new nets, I would have treated it because they say when you sleep under an ITN, mosquitoes do not touch the net... You see the goal is to protect oneself."

By the second visit in August 1998, the teacher had bought an ITN despite the misgivings about the price expressed earlier. However, by now he had changed his mind regarding the benefits of the insecticide.

I "So, have you re-treated your net?"

R "No, no not yet..."(laughing)

I "But now you have an ITN. When did you buy it? "

R "December last year. It should have been re-treated twice by now."

I "And what is the real problem?"

R "The problem is, it is poisonous stuff. They have written on the sachet: "Throw it in the pit latrine after use." That is my big worry. If they say, you have to throw it into the pit latrine, you have to understand: This means, it is a serious poison, and it should not be left laying around. This means, it can kill and endanger my life like any other poison... Even if you dilute it by water, it remains poisonous... For sure this is the main reason that I have not gone for the insecticide. You know, when you hear a thing is poisonous, you get worried...Do you think other people in this village are using it ? Can you give me their names? ..."

On the third visit in February 1999, the teacher has still not re-treated the ITN. He is still worried about potential side effects of the insecticide, especially now that they have a new baby.

I "So, has the ITN been re-treated this time?"

R (He laughs) "Actually I am planning to buy a new one for the baby. But the insecticide, I don't like it at all. "

I "Why?"

R "I am still concerned that it is poisonous, especially for our little baby."

This case underlines the fact that villagers are constantly planning, reflecting and weighing different choices they have. The teacher represents mainstream ideas. During the first visit, he explained that due to financial constraints, it was hard to buy ITNs, but basically, they were a good thing because they protect a person from mosquitoes. Later, he had actually managed to buy an ITN, but like many people, especially men, he now became increasingly worried about the potential side effects of the insecticide. This may be due partly to a rumour circulating in the area which said that virility may be affected by the insecticide, partly to the idea that babies are particularly weak and vulnerable.

These findings underline that the acquisition as well as the regular use and re-treatment of ITNs is not just a matter of indigenous knowledge as a potentially limiting factor. Several factors are involved, namely seasonal changes in the felt need for protection against mosquitoes, worries about

the safety of the insecticide as well as a mobile life style. Another constraining factor is financial capability.

This became even more evident in the second group. Lack of money was commonly mentioned as a limiting factor to the purchase of ITNs. By August 1998, 4 out of 15 households, and by February 1999, two out of the remaining 11 households had acquired an ITN. Again, having a baby was given as a reason for acquiring, re-treating and using a net. As in the first group, some of those who had become net owners did not re-treat and use the net because there were few mosquitoes.

Table 13 Follow up of people who did not own an ITN by January 1998

Explanation	August 1998 (N=15)	February 1999 (N=11)
Still no net because of financial constraints	11	7
Bought an ITN, re-treated and in use because of the baby	1	2
Bought an ITN not re-treated and not in use, waiting for mosquito season	3	-

Source: Field research 1996-1999

Most households faced similar financial constraints, but some managed to raise the cash needed for an ITN, as the following case of a farmer illustrates. During the first visit in November 1997, the household had no net.

I "Have you heard about treated mosquito nets?"

R "I have heard about those nets from different sources. Whenever my wife goes to the health clinic, they tell her to bring TSh 2,500 instead of TSh 3000 because she would get a special paper [a voucher] to collect the net from the shop."

I "So, has she gone to collect the net?"

R "No, you know, the problem is, there is no money to buy this net. ... To cut it short, I should say there is nothing for the time being. The sales agents who ride yellow bicycles from the project brought the insecticide and explained to me how they mix it with water and dip the net... The thing is when you are not serious with something, you don't follow it up. They

came again with the insecticide, but I told them there was no net in my house. Since then, I have not seen them again."

By August 1998, the household had acquired an ITN:

I "So, have you now got a treated net?"

R "You have come at the right time. We have two guests in the house … the new baby and the new mosquito net. I will tell you the story about this net. It was driving me mad: Every time my wife came back from the health clinic, she would come back here and quarrel. She made noise about the TSh 2500 and the special paper for the net. She became gloomy and didn't want to cook. ... One day I got very angry, I would have kicked her, but I felt pity because of her big belly. She started her noise again, and then she said: "The other women who have proper husbands, they all have their treated nets ready before the delivery." Then I knew the time to go to the river had arrived because when your wife starts talking about "proper husbands" then it is a big insult. I arranged in my head that before she delivers, I have to be prepared. ... So my calculations for her delivery date forced me to prepare the trip to the river. One day I asked her to prepare the bag for going to the river. She packed the bag with food, a cooking pot and other things so quickly that I knew I had to go. ... A week later, as a friend of mine said he was going back to the village, I gave him the money and said: "Tell her, it is for the net." I stayed away for another week because I wanted to give her enough time to get the net, so by the time I got home there would be no more net stories. ..."

On the third visit during February 1999 the net was not only in use but even re-treated:

I "So what about your treated net?"

R "It really helps a lot. You know, it has another benefit: It repels even house flies. ... When the child sleeps in the afternoon, no flies touch him. ... You see, other people don't know the benefits of this net because TSh 3000 for a net..., taking into consideration that it has the insecticide, the material is more durable than that of nets sold in the shops..., frankly, I have seen that I have gained. Especially during the first two weeks, mosquitoes don't touch the net. ... "

I "So , when have you last re-treated it?"

R "I had it re-treated last week, although there are very few mosquitoes around. I have seen that my child, if he sleeps frequently under this net, does not have fever like other

> children who are brought to the hospital every day. ... Until we traveled to my parents in Malinyi [an area in the Ulanga District], we had never brought him to the hospital for fever. We went to Malinyi leaving the net in Mchombe. I tell you, even if you look at Eric [the baby] now, you would see how mosquitoes had eaten him while we were there. He was not used to mosquito news *(habari za mbu)*. ... He had a very high fever, I thought we would lose him, he was admitted at a Lutheran hospital there. They made tests and said it was malaria. Luckily, the services there are good; he was on the drip and received lots and lots of water. Now, since we are back, I wish that my child is under the net all the time, and nobody can tell me these nets have poison or are not good for children. These people like talking about the bad side before knowing the good side of something. ..."

The case of this farmer documents a remarkable change from a husband who was pushed by his wife to earn extra money for an ITN to a fervent supporter of ITN as a protection not just against mosquitoes but also against malaria. His change of mind is grounded in personal experience regarding the health of his infant son.

Motivating and/or enabling factors in terms of acquiring, using and re-treating ITNs which can be deduced from this and from similar cases include social pressure, for instance by nurses on pregnant mothers and by the latter on their husbands, additional skills for earning money, in this case fishing, and positive personal experiences regarding the health benefits of ITN.

10. 5 Conclusions

This paper has shown that a modified version of Mundy and Compton's model (1995) can be used as a framework to guide investigations into social and cultural aspects of effectiveness of ITN interventions. While Quadrants A, B and C allow for a systematic inquiry into efforts to communicate project knowledge regarding malaria and its prevention with ITNs, Quadrant D directs attention to people's responses to these efforts. Most importantly, however, the model puts the interactions

between the project and local people into the centre of interest, focusing particularly on knowledge, practice and communication.

The KINET project discussed in this paper made use of all four of the quadrants in this typology. It drew on local knowledge relating to malaria and its prevention, combined it with project knowledge about ITN technology, spread resulting messages through project and local communication channels and monitored whether and how a sample community responded to these efforts. The most important lesson learnt is that not just well-designed IEC and launching campaigns at the beginning of an ITN intervention but continued dialogues are necessary to make interventions sustainable. Special efforts are needed to facilitate an on-going flow of information between the project and villagers through project as well as local communication channels.

A second lesson is that ethnographic monitoring identifies a range of factors that influence the acquisition, use and re-treatment of ITNs. At the constraining end are seasonal changes in the perceived need for protection against mosquitoes, worries about the safety of the insecticide used in net-treatment, and a mobile life style. Financial capability can be seen as an ambivalent factor: People who lack skills and/or commitment are likely to be unable to raise money needed for buying ITNs and paying for re-treatment services. Others living under similar conditions manage to mobilise social and economic resources. At the motivating and enabling end are such factors as social or peer-group pressure and perceived health benefits and other positive effects of ITNs.

Once such factors have been identified, they can then be taken into account by the project team. While a project like KINET cannot improve most aspects of the living conditions of villagers, it can respond to worries and misunderstandings by taking them seriously and making adjustments, for instance regarding the formulation of promotional messages and identification of communication channels.

A third lesson concerned the role of the village-based fieldworkers of the Demographic Surveillance System. These local staff were recruited for the collection of demographic data, but as the ethnographic findings have shown, they were the most important source of information regarding ITNs for most people in the sample hamlet. Indeed, the DSS fieldworkers, like the anthropologist, had learnt much about villagers' worries and problems in the course of their home visits. The project team responded by addressing these issues during a refresher-training for the fieldworkers. Various topics like the safety of the insecticide used in net-treatment were discussed with the aim of coming up with clear and correct messages which the fieldworkers could then disseminate in the course of their normal work.

In a new ITN intervention, fieldworkers of the DSS system should be trained in what we called "ethnographic monitoring", that is in qualitative monitoring of people's responses to the intervention. If a representative sample of people would be regularly interviewed with regard to their acquisition, use and re-treatment of ITNs, the distribution of trends, worries and questions in the communities could be assessed at regular intervals and fed back into the ongoing implementation process.

A fourth lesson is that, in addition to the fieldworkers, the staff of MCH clinics are an important channel for the communication of ITN knowledge but also of products and services. Indeed, ethnographic data show that the MCH staff are not only an important source of information but also exert pressure on women to acquire nets for their small children through the voucher system. It seems that, within partnered households, women then exert pressure on their husbands to provide the cash needed to buy a net or re-treatment. This implies, in other words, that gender is an important variable in ITN compliance, a topic which calls for further investigation.

As this discussion has shown, research on compliance with ITN interventions should move away from a static view and examine dynamic aspects of knowledge and communication. The juxtaposition of project and local knowledge, practice and communication suggested in this paper provides a useful frame for such an analysis.

Chapter 11 Reconsidering the Concept of Household Headship. Reflections on Women's Notions and Practices of Headship in Dar es Salaam, Tanzania

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11.1 Introduction

This paper reports about work in process. From 1995 to 1997, supported by the Swiss National Science Foundation, we conducted a research project in Dar es Salaam, Tanzania. The aim of this project was to study household health decision making. This idea has grown out of collaboration with the Dar es Salaam Urban Health Project which is sponsored by the Tanzanian government and the Swiss Development Corporation and executed by the Swiss Tropical Institute in Basel. In discussions with the staff members of the Dar es Salaam Urban Health Project and the Swiss Tropical Institute we came to realize that in order to get a deeper understanding of people's health and illness behavior, we need to take a step back and focus on decision making processes which lead to this behavior.

Since we were interested in people's day-to-day life, we selected the household as a window into health-related decision making. Several authors have pointed out that "household" is a problematic concept (Moore 1988:54-56, Moser 1993:16-17). Wilk and Miller (1997:65), however, argue that the problem is not really with the concept of "household" as a domestic unit. The problem, in their view, lies with the notion of corporateness, with the idea that society is invariably composed of bounded units with restricted membership, social rules of their own, systems of leadership, common property and social charter. A conceptual model of household and corporateness which many regard as an ideal in Western Europe says that father and mother collaborate in order to provide a healthy environment for their family. It is a well-known fact, however, that in every society kinship systems, as a product of history and culture, have developed rules that assign different kinds of family power to men and women (Maynes et al. 1996:2).

One approach to the study of male-female power relations in the family is to investigate local concepts of "headship". Recent years have seen

an upsurge of interest in studies on household headship. Some studies looked *at* households rather than *inside* them and wrongly assumed the husband to be the main breadwinner and head of household (Moser 1993:16,20). Feminist scholars convincingly argued that rather than assuming the husband to be the head of household, one should investigate whom household members designate to be the head and what criteria they use. As a result of this approach, particular attention has been paid to the issue of female-headed households. Female-headed households are emerging, in apparently increasing numbers, in a variety of communities around the world (Moore 1988:62). In urban areas, especially in Latin America and parts of Africa, the percentage of female-headed households reaches fifty percent and more (Moser 1993:17).

Recent research in Tanzania has shown that due to the economic crisis which seized the country in the 1980s and the hardships *(hali ngumu)* it caused and continues to cause for the majority of the population, women's role in the household economy has changed. Many women have been forced to enter the informal sector because the husband's wages no longer meet the household's basic needs (Koda and Omari 1991). According to Tripp (1989:601) a study conducted in 1971 found only 7 percent of urban women in Dar es Salaam self-employed. In her own study seventeen years later approximately 66 percent of women surveyed were self-employed. Tripp suggests that these alternate sources of income ultimately gave women greater control over, and more autonomy within, their households.

When we discussed this literature in our research team, we realized that Tripp's suggestion made a lot of sense to the Swiss anthropologist, while the two young Tanzanian social scientists contested it spontaneously. The crucial point of disagreement was whether increased economic independence leads to increased social power and control for women

in the family. We reached a working agreement: The idea that a wife's power relative to the husband increases when she has her own income might be a Western folk model which has grown out of the women's movement and that this model may not be born out by evidence in Dar es Salaam.

We thus decided to investigate how women themselves assess dependency relationships within the family. Do they consider themselves to be dependent on the husband, and if yes, do they associate this dependency with the concept of headship? Are there other kind of dependency relations within households? Which are the social characteristics of women who share similar life experiences in terms of dependency and/or headship?

11.2 The study setting

Data were collected during household interviews in Ilala, a low standard, high density residential area with a population of almost 10,000 people (Adult Mortality and Morbidity Program 1995). We drew a purposive sample from the Adult Mortality and Morbidity Program database using the following criteria: 1) There is a woman in the household, 2) she is between thirty and forty years of age, 3) she has at least one child under five and 4) she has lived in Ilala for at least five years. To have a woman in the household was, of course, essential to capture the female perspective. We limited the age range and included only women with at least one child under five because other studies have shown that the domestic power structure changes with the developmental cycle of the family (Lamphere 1974). By defining minimal length of stay we tried to control differences between recent immigrants and urban dwellers. Of the 2385 households in Ilala, 159 fulfilled these criteria. Some of these had moved out of Ilala or the

mother was temporarily absent, others no longer qualified (e.g. death of mother or child). The final sample consisted of 100 households.

The people who live in Ilala are called Swahili by other inhabitants of the city. In the majority of the selected households, both woman and spouse were Sunni Moslem (73 percent) and originated from an ethnic group along the coast or along the old trade route leading to Ujiji on the Lake Tanganyika. One quarter of the selected households were Christians or of mixed religion. All in all, the women in our sample came from forty different ethnic groups. Whether or not the Moslem couples are Swahili in the strict sense of the term is open for scholarly dispute (see Middleton 1992:1-3), but most of them have been influenced by Swahili culture.

In other urban Swahili communities, for instance in Mombassa and Lamu (Swartz 1982:37, Middleton 1992:108), most households reportedly had male heads. Not only among the Swahili, but in Dar es Salaam in general „men used to control the means of production and household income, as well as dominating in decision-making" (Koda and Omari 1991:128). Such generalizing statements may, of course, obscure more than they reveal. The careful analysis of power in Swahili marital relations by Swartz (1982) clearly shows that there are areas of life in which women can control their husbands despite the widely shared understanding that husbands should and do monopolize power in the spouse relationship. Similar reports from many different societies have shown that women are sometimes represented as subordinate to men while not in fact being so as regards their ability to act, speak out and make decisions in the world of day-to-day interaction and living (Moore 1988:35). This situation is sometimes referred to as the „myth of male dominance" (Rogers 1975). Gender stereotypes are developed and used in the strategies which individuals and groups of both sexes employ to advance their interests in various social contexts (Moore 1988:37).

Things become even more complicated, if gender stereotypes become linked with ethnic or religious stereotypes. We are aware that these are sensitive and hotly debated issues in contemporary Tanzanian society. In this paper we cannot present a deep analysis of this complex issue but we hope to make a modest contribution to the current debate.

According to the classification of the Tanzanian sociologist Joe Lugalla (1995:126-129) the people in our sample belong to the very low level of the urban middle class. 19 percent of the women respondents and 60 percent of the spouses were low income wage earners. Others were self-employed and worked as petty traders, small-scale entrepreneurs and long-distance traders. Half of the households had more than seven members, and many of the households shared a single room (53 percent) or two rooms (29 percent). The daily food budget in many households (59 percent) was under Tsh 2000 (Sfr. 4), and in none of them more than Tsh 4000. At the time of field research, Tsh 2000 covered the costs for one meal of rice and meat for a household of seven members.

11.3 Local notions and practices of headship

In order to assess local notions and practices of headship we asked the women two open questions: "On whom does your family depend? And why?" The answers to these questions can be grouped into four categories: The first category of answers clearly identifies the husband as the one on whom the family depends. The second category also identifies the husband, but these answers all contain an element of doubt, ambivalence or critical reflection. The answers of the third category were a surprise because they claim that the family depends on both mother and father. Households which depend on the woman were subsumed under the fourth category. In this section, we briefly

discuss each category and examine social characteristics of the women who seem to share similar experiences of dependency.

11.3.1 The man is the head

The first and biggest group of women (60 percent) clearly identified the man or husband *(mume)* as the person on whom they all depend. Some of them explained that the man is the head of household *(kichwa cha nyumba)* or the owner of the household *(mwenye nyumba)*. The expression *kichwa cha nyumba* (*kichwa:* head, *cha:* of, *nyumba:* house or household) uses the same metaphor as the English term "head of household". Whenever there is a man in the family, one woman said, he is the head, regardless of his economic position. As another woman put it:

> "We depend on the husband. He is the one who married me. I just help him. He is the acknowledged one. Even if he does not have an income generating activity *(shughuli)*, even if he does not have work *(kazi)* outside, he is acknowledged as head *(mkuu)*. Perhaps if a woman is without a man… ."

Another woman said:

> "You know us women. When there is a man, we depend on him."

Another recurrent theme was that women's dependency is created by marriage. Several women said: "To be a husband means to have the responsibility *(wajibu)* of taking care for the wife and the children." The woman, on the other hand, has the right *(haki)* to depend on the husband. Women who take this stance attribute a positive value to women's dependency; they interpret it as a right, not as a constraint. According to this view, women first depend on the father, then on the husband, as the following two statements illustrate.

> "He took over the responsibility of caring for me from my father."
>
> "He is the one who married me, who took me away from home. I have the right to depend on him."

A third and related theme emphasises the link between headship and the provision of family's needs. The one who takes care *(mtunzaji)* is the head *(mkuu)*. Several women spoke of providing for the family as a capability *(uwezo)* and claimed that they lack this capability.

Another view interprets headship mainly in terms of leadership. The head is the one who leads *(anayeongoza)*, and again some women claimed that they themselves cannot lead. One of them said:

> "I am a woman. I cannot tackle difficult issues. Whenever there is a problem, he solves it. "

Another woman pointed out the close links between headship, leadership and the provision of family needs:

> "The head *(mkuu)* is the one who leads. I can't lead. The one who works is the one who has a word to say because he is the one who provides food for the family. "

Most women in this category (see Table 14) are Moslem and have no formal or primary education. This should, however, not distract our attention from the fact that another seven Moslem women have secondary education and eight women are Christian. What is startling is that more than half of all women who said they depended on the husband actually pursue an income generating activity. Further inquiry showed that all of them contribute to the daily family income. Most of them are petty traders selling cooked food (*maandazi, chapati, kachori*, fried fish), ice-cream, fruit or clothes. Four women are small-scale entrepreneurs; they own a small restaurant *(hoteli)*, a hair saloon or a chicken yard. One woman trades with maize from Dodoma. Six women are wage-earners. They work as room maid, nurse, teacher,

secretary, and one of them sells telephones for the state-owned Telecom company.

11.3.2 Man is the head but ...

Similar themes as those identified in the first category emerge in these answers, but we can detect a certain ambivalence or critical reflections on whether the man is really the head. The women in this category clearly express, although often only at second thought, a higher recognition of their contribution to the family. The following examples serve as illustrations.

> "My husband is the head because he is the one who feeds us. He is the breadwinner *(mtafutaji)*; we are just here to cook. It is his honor. Even if I was the breadwinner, he still remains to be the head. ... Heads *(wakuu)* are father and mother."

> "My husband is the head. He is the leader of the house *(kiongozi wa nyumba)*. We women have inherited to be led by men. Men are given priority. A woman may have the capability to lead but, because of this inheritance, she leaves the headship to the man. Although a man cannot do anything without being advised by a woman. ... The household is led by the woman."

> "The father. Normally he is really the head of the house *(kichwa ndani ya nyumba)*. We must give him his respect *(heshima)*. In addition to that women are very much responsible for caring for the family. He is the supervisor *(msimamizi)* of all. God created every person with his place. The husband is the head of the household, even the Bible says so. "

> "The father. I am a house wife. I do not have any business. My part of headship *(ukubwa wa nyumba)* - I take care of the children, the health of the father, but I cannot provide the food. The father can provide food. The father is the head, the husband is the head - because he is a man. A son is treasured more than a daughter."

It is interesting to note that, in terms of social characteristics, the women who gave these answers do not differ from those whose answers were

classified as the first category. The majority are again Moslem women with no formal or primary education, but we also find Moslem women with secondary education and Christian women in this group. All but five women pursue an income-generating activity. As petty traders they sell cooked food or fruit. Two of the small-scale entrepreneurs are self-employed tailors or have a Taylor work for them. Two women trade with second-hand clothes, and another one buys rice in Morogoro and sells it in Dar es Salaam.

Table 14 Social characteristics of the women

	Man	**Man, but...**	**Parents**	**Woman**	**Total**
	(N=60)	(N=14)	(N=14)	(N=12)	
a) Religion and education					
Moslem					
No formal education	6	1	1	-	8
Primary education	39	8	3	6	56
Secondary education	7	2	-	1	10
Christian					
Primary education	4	2	7	4	17
Secondary education	4	1	3	1	9
Total	60	14	14	12	
b) Women's occupation					
None	23	5	1	1	30
Petty trader	26	4	3	3	36
Small-scale entrepreneur	4	2	2	-	8
Long-distance trader	1	3	-	2	6
Wage earner	6	-	8	6	20
Total	60	14	14	12	

11.3.3 Parents are the heads

The answers in this category have in common that all of them identified the woman and her spouse as heads of household. Like the women in the first two categories they mention struggling, caring and providing food as attributes of headship, but they express strikingly new ideas about male-female relationships, namely those of helping one another *(kusaidiana)* and of parents' shared responsibility *(wajibu)*. Again we quote a few examples of verbatim statements:

> "Their father and myself. The thing is to help one another *(kusaidiana)*. He goes to work, and I busy myself with activities at home to generate income."
>
> "The father and I. Because we are both parents. When you see how difficult life is, helping one another is a must."
>
> "The father and the mother. Our status is the same in the home."
>
> "They all depend on me and on my husband. It is our responsibility to care for the family because it is ours."
>
> "My husband and I. We help one another. With the hardships we face, you cannot leave it to him alone."

The social characteristics of the women who gave these answers slightly differ from those of the first two categories. The majority of them are Christians - three of them married to a Moslem - and have a wage-earning job as bank clerk, secretary, nurse attendant, printer and one sells shoes in her husband's shop. In addition to these jobs, they all have at least one other activity, usually petty trading. One woman works as a traditional healer, and another one operates a water selling business with seven wooden charts run by young men. The petty traders sell fruit, fish, peanuts, rice pies and home-made pasta *(tambi)*. There is only one woman in this group who did not work at the time of the interview; she used to collect scrape metal and transport it to Mombassa for sale and just stopped for several weeks.

11.3.4 The woman is the head

The fourth and last category comprises those women who said they were the head of the family. The meanings given to headship also refer to providing for the family, work and taking care of the needs.

> "I am the head. I have no husband, and I am used to struggle *(kujiangaisha)* by myself."
>
> "I am the one. There is not service *(huduma)* from the father of the children."
>
> "It's me, the mother because my husband has retired."
>
> "Myself. I am settled in one place. My husband's activities do not allow him to stay long in one place. He travels a lot."
>
> "Myself because I am the one who is at home most of the time. The father is the one who brings food. He cannot even say: Have you eaten? It is I who is responsible that the children have eaten."

The civil status of these women vary. Two women are widowed, five are separated from the father(s) of their children, one has a boyfriend who lives elsewhere and another one a husband who frequently travels. What is surprising is that two of these women actually live with their husbands. One of them is a Christian, and her husband has retired. Since she is the main bread-winner, she calls herself head of household. The other woman is a Moslem, has not finished primary school and bakes cakes for the hotel which her husband owns.

Slightly more than half of these women are Moslem. Most have primary school education. Six of them are employed as teacher, secretary, waitress, nurse or fieldworker in a malaria project. Three sell fried fish, buns or second hand clothes as petty traders. One woman buys millet in Mbeya and sells it in Dar es Salaam, and another woman takes music cassettes to Zambia and sells them there. Only one of these women does not pursue an income generating activity. She calls herself „head" because she has several children from different men.

11.4 Links between headship as normative category and lived experience

The concept of headship in Western cultures evokes the image of a group of two or more people with one person taking the lead. Studies in Europe and other societies have shown that headship in the context of household or family commonly implies that a person carries primary economic responsibility, functions as the primary decision-making authority or is the most respected person (Bruce and Lloyd 1992:5). All these attributes stand for dependency relationships: one person has primary economic responsibility, primary decision making authority or most respect and the others depend on this person. The attributes of headship identified in Ilala largely correspond with these findings. But our data also demonstrate that - like in many "modern" families in Europe and elsewhere - new notions of headship may evolve, such as shared headship by father and mother.

Recent evidence from Latin America through Europe and southern India shows that, even in male dominated societies, lower-class women in a number of cases are less restricted by male control than upper-class women, but this often means that they are also less likely to be able to command male support, especially from the fathers of their children (Maynes et al. 1996:18). We recorded cases in Ilala, in which less restriction by male control meant that women were left to fend for themselves and for their children with minimal or no support from the fathers of their children. This mostly applied to female-headed households of widows or separated women, as the first two statements in that section illustrate (see above). Our data confirm the findings reported in Maynes et al. (1996:7) that despite the presumption of male domination written into many rules, in practice men are unable or unwilling to fill the roles prescribed to them.

Partnership in a parent-headed household is a very different form of less restriction by male control, and we have not yet found supporting evidence in the literature for women who live under comparable circumstances as those in Ilala. The answers of these women express a different gender model than that identified in the first two categories. Several Moslem men commented that Christians usually go to special classes which prepare them for marriage and teach them that they should help one another and not leave the burden of providing for the family alone to the man. Moreover, the Christian gender model, like the Moslem gender model, historically evolved out of a patriarchal society. This is illustrated by the statement of the Christian woman who refers to the Bible and says that "God created every person with his place". It is important to keep in mind, though, that there are different readings of the Bible and the Koran, even within the same society, and reinterpretation of gender models is an on-going process, also in Ilala. It is well possible that changes in headship practices - and more generally reinterpretations and re-constructions of gender through daily practices - feed back into the dominant gender models (see Torab 1996:238). If, for instance, in a place like Ilala and, in fact, all over Dar es Salaam economic hardships force women to earn money to complement the husbands' wages, these new day-to-day practices may bring about changes in the recognition of male and female contributions to the household, and these changes in daily practice may lead to a re-formulation of dominant gender models. This is another interesting idea which needs to be further explored.

Another startling finding is that women who portray themselves as being completely dependent on the husband and even as lacking the ability to search for money actually do pursue an income generating activity. There are multiple interpretations of this apparent contradiction. One possible interpretation is that incomes earned by women do not

necessarily translate into the same kind of power as that of men (Moser 1993:27). Several women considered their income as irregular and/or insignificant compared to that of their husband. One teacher said, for instance: Although I work, the salary is not sufficient; he contributes a bigger share. Teacher's salaries are, in fact, very low; but similar remarks were also made by petty traders who earned a good income. Another interpretation is that, in this interview situation, women state the public gender ideology that does not necessarily correspond with day-to-day reality. It is a well-known feature that cultural representations of gender rarely accurately reflect male-female relations, men's and women's activities, and men's and women's contributions in any given society (Ortner and Whitehead 1981:10). Still another interpretation is that many of these women - both Moslem and Christians - acquiesce in this gender model. For some dependency carries a positive value, and they justify their attitude by saying that it is part of Swahili culture. They explain that in former times the Swahili practiced a rather strict form of *purdah* (*kutawa* in Swahili), and the separation of life into men's spheres and women's spheres was both sharp and carefully enforced (see Swartz 1982:27). Some families in Ilala still follow this practice. Women stay indoors, run the household, take care of the children and participate in exclusively female activities with other women. When they leave the house, they do so only in company - usually of a male family member - and wear a sort of cape *(baibui)* that covers the head and the whole body. In the interviews some women considered such a secluded life as an ideal. As Wadley (1994:54) correctly observes with reference to *purdah* in India, it requires the financial resources to build the structures behind which women can hide. To be able to maintain *purdah* is itself a sign of wealth and status. Interestingly, it was the most well-to-do woman in Ilala who spoke most fervently in favor of staying inside and being cared for by the husband. Viewed against this background one might interpret that women's statements in this category referred to an

ideal in which men have the responsibility to provide for the family and women have the right to depend on them. Unfortunately, from the point of view of these women, economic circumstances allow only a few privileged men and women to realize this ideal.

The statements of the women in the second category have a slightly different ring. Especially the perception of their status and power in the household differs. In most answers, the husband and father of the children is first recognized as the head, but then, on second-thought, their own role in the household is reconsidered and reevaluated, most often in a positive way. Some women add that they and their husbands or even themselves are the head of the household.

11.5 Conclusion

The data of our study in a low-come neighborhood of Dar es Salaam illustrate that the rapidly changing urban context forces men and women to reassess, and possibly redefine, their rights and responsibilities toward one another and their wider social networks. Headship as notion and practice is an expression of gender relations in a society. Gender - like other forms of identity drawing on class, age, ethnicity or race as markers - is constituted through interpersonal relationships and daily activities, as well as normative processes (Torab 1996:238). In their day to day lives both men and women draw on dominant models of gender in defining their own identity. In order to understand our data from Ilala it is important to bear in mind that "individuals interpret and reconstruct their gender in a continuous process" (Torab 1996:238).

"Headship" is not a clear-cut category; it carries different meanings in different contexts. In this paper we examined women's reflections on dependency and headship in household interviews. We did not yet compare these reflections with the answers to other questions or with evidence from data collected with other methods. Their reflections thus capture only what they said in this particular interview situation. It is a

well-known fact that people may say one thing and do another, not because they are inconsistent but because a statement about a hypothetical situation may not reflect on all potential situations in real life. Headship is context-bound and subject to change, for instance because the life situation changes - as we often observed in Ilala - or because a person interprets her position differently in varying situations. All these aspects call for further investigation.

Preliminary as they are, our data seem to confirm the findings of other scholars who argue that fundamental change for women cannot be based solely on increased earning (Dwyer and Bruce 1988:9). In other words, Tripp's (1989) suggestion that alternate resources of income ultimately give women greater control over, and more autonomy within, households is not born out by evidence from our data. Many women who earn money and contribute to family income recognize the husband to be the head of the household. These women thus enact and reproduce the dominant definitions of their gender as subordinate to men even though they have independent means. A recent study in a low-income neighborhood in Cairo (Hoodfar 1988:121) provides a refined frame of analysis which is better suited to make sense of the data we collected in Ilala than that provided by Tripp. Hoodfar argues that it is not the economic or non-economic participation of women *per se* that guarantees their higher status and position. What appears to be more important is how her total contribution to the family and the wider society is recognized and valued by the woman herself, by the family unit and by the wider society. In this paper we examined how women in this low-income neighborhood of Dar es Salaam recognize and value their contribution to the family. We found that women's recognition and valuation of their own contribution varies widely. At one end of the spectrum we found women who did not mention their contribution at all, although we know from their answers to other questions that they, in

fact, contribute substantially to family income. At the other end we identified a woman who bakes cakes for the hotel owned by her husband and who calls herself head of household although his contribution to family income is probably much higher than hers. Women's self perception does seem to matter when it comes to their interpretations of dependency and headship in the household. Additional research is needed on the ways in which the family unit, the husband and the wider society recognize and value women's participation.

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Chapter 12 Household, headship and gender in malaria control: Findings from an ITN intervention in the Kilombero Valley, southern Tanzania

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12.1 Introduction

Malaria continues to be a major threat to life in many tropical countries. The World Health Organisation (1999) estimates that almost 300 million clinical cases of malaria occur world-wide each year, and over one million people die. Nearly 90 percent of these deaths occur in Africa, where young children are the most affected. The great hope for malaria control remains the development of a malaria vaccine, but despite great progress, it will still take some time until a vaccine can be used in public health programmes (Tanner 2001). The main component of current malaria control strategies is early diagnosis and prompt treatment in health facilities. Moreover, malaria control should be tailored to the local situation; it should consider the social, cultural, ecological and political context of the disease and its prevention as well as treatment in a given area. In this respect, the household has been identified and promoted as a promising and main target of the interventions. Especially in areas of high endemicity, where children are those suffering most and mothers/care takers are constantly confronted with disease and death and forced to rely on whatever prevention and treatment methods available to them, it is of particular importance to conduct a gender analysis of power relations within households (Tanner and Vlassoff 1998).

This paper uses a gender perspective to examine household dynamics with a focus on one particular malaria control technology: insecticide-treated nets (ITNs). Over the past decade, interest in ITN as a malaria control technology has grown rapidly. Findings from large-scale trials conducted in Africa have shown that ITNs can potentially halve the clinical malaria episodes from both *Plasmodium. falciparum* and *P. vivax* infections under most transmission conditions (Lengeler 1998). Large-scale implementation programmes are underway and have a main focus on sustainability, especially issues of delivery, distribution and use of ITNs (Tropical Disease Research 1997, WHO 1999).

"Gender" refers to characteristics of men and women that are socially and culturally constructed, in contrast to sex which is biologically determined (Rathgeber and Vlassoff 1993, Doyal 1999, WHO 1998). Until now, few studies have documented gender differentials in the acquisition and use of ITNs. In Benin, women mentioned lack of access to money as a main reason for not getting mosquito nets; men referred to the costs of nets. Earning an income - even if it was lower than that of their husbands - enabled women to purchase nets at their own will (Rashed et al. 1999:1003). Access to cash may also influence regular re-treatment of mosquito nets. In Bagamoyo, Tanzania, women said, they did not re-treat their mosquito nets because they did not have control over the household budget (Winch et al. 1997:767). A wife may be willing to re-treat nets but does not have the money; her husband may have money but not assign high priority to treatment.

Gender but also age and household composition have been found to influence the use of ITNs (Aikins et al. 1993, Makemba et al. 1995, Tanner and Vlassoff 1998). In the Gambia, young children usually slept with their mother and were by default protected by her net (MacCormack and Snow 1986:130, Aikins et al. 1994:84). In Bagamoyo, Tanzania, it was mainly adult men who used nets, followed by mothers and children under two who slept with them, while elder children commonly had least access to mosquito nets (Makemba et al. 1995:58).

12.2 Background of the study

This study was carried out as part of the Kilombero Net Project (KINET) in Morogoro Region, Tanzania (see Fig. 2). From July 1996 to June 2000, the project used a social marketing approach to promote and distribute ITNs in the Kilombero and Ulanga districts of the Kilombero Valley (Armstrong Schellenberg et al. 1999). In the project area, transmission of *P. falciparum* malaria is intense and perennial, with a peak during the rainy season. The main vectors are *Anopheles funestus* and members of the *A. gambiae*

complex, including *A. gambiae* (sensu stricto) and *A. arabiensis* (Tanner et al. 1991, Smith et al.1993).

Results indicate that the social marketing approach has achieved good coverage of ITNs in the main target groups: By the end of the second year of the intervention, 61 percent of children under 2 years of age (Abdulla et al. 2001a) and 52 percent of children under 5 years of age (Abdulla 2001b) regularly slept under an ITN. Many households also owned untreated nets sold in local shops which were gradually replaced by ITNs. This means that after two years of intervention activities, only 17 percent of the children were without a net.

To own a net, of course, does not necessarily mean to use it (Minja et al. 2001a, 2001b). Within a sample of 199 children under 2 years whose parents claimed to have a net, observations of sleeping places indicated that 117 children actually slept under a net (Abdulla et al. 2001a). In other words, nearly 60 percent of the children under two years with a net slept under a net.

12.3 The study setting

In order to examine the gendered household dynamics involved in getting/ using and not getting/ not using nets , an ethnographic study was conducted in Mchombe village, Kilombero District, about 80 km from Ifakara town. Mchombe is one of the 18 villages selected for Phase 1 of the KINET project (see Fig. 3).

Mchombe is a big village. It has a church, a railway station, two primary schools, a government dispensary and private shops. According to the Demographic Surveillance System set up by the project, Mchombe had a population of 6789 in 1997. The village is divided into eight administrative units called *vitongoji* (neighbourhoods or hamlets). The health services in the village comprise a government dispensary, a Roman Catholic dispensary and village health workers who have become inactive due to

lack of remuneration. Various types of traditional healers as well as private local shops selling pharmaceutical products are also common in the area. Most villagers rely on subsistence farming of rice, maize and cassava for their livelihood and earn some cash in small-scale business activities.

The village Mchombe has been inhabited for at least the past 100 years. It is not one of the communal villages called *vijiji vya ujamaa* (Ujamaa villages) established during the social engineering project of the Tanzanian government in the early 1970s. Still, ethnic heterogeneity characterises the village, with Wandamba, Wapogoro, and Wahehe representing the majority. If husband and wife come from different ethnic groups, families speak Swahili at home, if they come from the same ethnic group, they usually use the vernacular language. The kinship systems are patrilineal; the members of a lineage trace their descent in the male line. This has implications for property rights with regard to movable and non-moveable items and for marriage arrangements. Marriage by custom in the sense of living together (*kuishi uchumba)* rather than formal arrangements by law and/or church are a common feature of social life in the area.

12.4 Methods

The ethnographic study was carried out in the hamlet Lukolongo. This hamlet has a population of about 790 people and is more rural in character than the central neighbourhoods of Mchombe; the homesteads are scattered over a large area. After a census, 150 households were selected for a first interview from November 1997 to January 1998 to establish a social profile. The interview guideline included questions about household structures, headship as well as gender relations affecting net acquisition, ownership and use. Based on a preliminary analysis, 30 households were selected for a follow-up to document changes over one year. The households were revisited in August 1998 and

in February 1999. The interviews were complemented by participant observation.

12.5 Gender, headship and net ownership

The findings of the first round of interviews from November 1997 to January 1998 show that the majority of the households in the Lukolongo sample (N=150) owned a mosquito net (see Table 15). Only 10 percent of the households - defined as residential units - did not have a net. Most households (71 percent) had an "old net" (*chandarua cha zamani)* or "ordinary net" (*chandarua cha kawaida*) which had been sold in local shops prior to the project. 28 households (19 percent)had bought an ITN from the KINET project or used the project's services to treat an old net with insecticide.

It was commonly the husband who purchased an ITN; only six buyers out of 28 were women. The men and women who had bought an ITN were actually the heads of their households. The other members of their households referred to them as the ones "who owned the household" *(hapa ni kwa nani)*. They considered them as the primary decision-makers, for instance as the person entitled to give permission for the household interview (*mwenye kutoa ruhusa kwa mahojiano*). These men and women were further described as the ones who "go out in search of cash" (*kwenda kutafuta*), they were, in other words, the main breadwinners.

Men headed various types of households. In the Lukolongo sample, most male headed households were nuclear in the sense that mother, father and children, in some cases grandmother, grandfather and grandchildren lived together. The children had not necessarily been born to these (grand-) parents. In Kilombero District, the terms "parents" and "grandparents" are often used as a social rather than a biological category. Many of these "nuclear" households actually represented "composite" households; their members had been regrouped after separation, death or divorce of a nuclear household.

The second type of male-headed households were extended households with an adult relative attached to a nuclear household. A few households were polygamous. Some men were also heads of single-parent households. These men either lived separated from their wife or were widowers. A few men shared a house with their wife (couples) or lived on their own without partner, parent, children or relatives (singles).

Women were usually the heads of single-parent households, either *de jure* or *de facto* (Moser 1993). Most were *de jure* female headed households: they depended permanently on a woman, either a widow, a divorced woman or a woman who never married. A smaller number of households were *de facto* female headed: they depended, at least partially, on a husband but this husband was temporarily absent because he had migrated for economic reasons, mostly to the river for fishing or to other villages to do construction work.

The person who bought a net was considered as the owner of the net unless he or she gave the net as a gift to somebody else. Since it was usually the household head who purchased a net, headship also seemed to be a proxy for net ownership.

Table 15 Household type, headship and net ownership (N=150)

Household type	Male headship (n=112)			Female Headship (n=38)		
	No net	Local net	ITN	No net	Local net	ITN
Nuclear	3	44	13	0	0	0
Extended	3	21	5	0	0	0
Polygamous	1	3	2	0	0	0
Single-parent	1	4	1	4	24	6
Couples	0	4	0	0	0	0
Singles	2	4	1	2	2	0
Total	10	80	22	6	26	6

Source: Field research 1996-1999

Plate 15 Casual labourers making bricks (Photo S. Abdulla)

Plate 16 Women and their food selling business (Photo: H Minja).

12.6 Gender, economic activities and net ownership

In partnered households nets commonly belonged to the husband. Most women who had bought and thus owned a net lived on their own or with their children. Women in partnered household depended on the goodwill and the economic capability *(uwezo)* of their husband. In single parent households headed by women, net ownership was mainly determined by their own economic skills and activities.

As expected in a rural area, most household heads, whether male or female, were involved only in farming or in farming with an additional income generating activity. To earn cash, men commonly engaged in fishing, brick making, timber work, or casual labour, women in local beer brewing and selling, casual labour or handcraft like mat-making or pottery. Three men and one woman owned a shop and relied on small business. Others earned a monthly wage as teachers, various types of workmen and traditional healers.

Table 16 Headship, economic activities and net ownership (N=140)

Economic activity	Male headship (n=106)			Female Headship (n=34)		
	No net	Old net	ITN	No net	Local net	ITN
Farming	3	39	5	2	5	2
Farming and other activities	4	32	11	2	14	3
Small business	0	2	1	0	0	1
Wage-earning	1	4	4	0	4	1
Total	8	77	21	4	23	7

Source: Field research 1996-1999

Although the numbers are small, they indicate that almost half the households headed by men who earned a wage had indeed an ITN. On the other hand, only few households headed by men involved only in farming owned an ITN.

Almost half of the women living in male-headed households actually earned a small income. They commonly pursued the same type of income generating activities as female heads of household, for instance, local beer brewing, making mats or pottery, casual labour or trading in food and two women worked as primary school teachers. Women however did not consider their engagement in small-scale income generating activities as "searching for cash" but rather as assistance for daily household necessities (*msaada kwa matumizi ya kila siku ndani ya nyumba*). Only one woman living in a polygamous household actually used the money she earned to buy an ITN; the others relied on their husbands.

Few women heading a single parent household had an ITN; one possible explanation is that women headed households tend to be poorer than male headed ones, and thus have less money to spend on ITNs. Fellow villagers refer to women as "poor" who - out of abrupt changes in the course of social life like loss of a partner, chronic disease or divorce: constantly face financial difficulties to buy the day-to-day household necessities and other goods such as ITNs. However, as the following case histories of two women who lost their husbands show, the economic skill and activity of the woman determines whether she actually becomes poor or not.

12.7 Widows and ITNs

12.7.1 The case history of Mama B.

Mama B. has four children; the last-born is seven months old. One child lives with her brother who is a teacher in Ifakara. When her husband died, his relatives said they would take care of the children; but Mama B. claims not to have received any help from them. She had to leave the house where she had been living with her husband because it now belonged to

the relatives of her late husband. Mama B. moved back to the house of her mother who is a widow.

Mama B. "Now, together with my children, I start a new life. It is easy when you are with your partner. You can help each other. I got ill the other time. I was moving like a mad person. Then all the children got ill. The elder brother of their father came to see them but did not give any support apart from looking with his eyes. You see people tell me that I don't have any right over that house because we were not together the time he built it. Look at my mother: She is too old, she cannot supports herself. She needs help from me, but I just can't give it. "

Interviewer "So, have you heard about treated mosquito nets?"

Mama B. "Oh yes, many times! Whenever I go to the health clinic, they make a lot of noise about those nets."

Interviewer "Do you have any net in your house?"

Mama B. "No. Any net with this difficult living conditions? This year, living conditions have become so bad. Last year, I had a good harvest from rice. I sold half of it because I needed capital to start a small business at the train station. Beginning this year, it was very difficult for me because of the floods. Nobody had a good harvest this year. I tell you: There is no food in my house, no money, nothing. The head-teacher from our school has sent my two boys home because I did not pay the school fees for this year. I have not been able to pay till today."

"I am busy with the home made pastries (*mandanzi na chapati)* which I sell at the train station at night. I do it everyday, except for those days when the passenger trains don't operate."

Interviewer "How much do you get out of your business?"

Mama B. "Normally Tsh 3000 should come out, when I finish everything. Then I have to buy 3 kg of wheat flour for Tsh 990, 1/2 kg of sugar for Tsh 240 and 5 measures of cooking oil for Tsh 500. The profit I get goes to food and other small things like soap, salt and kerosene. The older boy helps me carrying the things to the station, and he takes care of the baby when I start selling. So my business is from nose to mouth. For this reason, the net project should give people like us the nets on a loan and allow us to pay in small amounts, may be every week."

Mama B. does not have a strong social network which can support her after the death of her husband. She receives help only from her own relatives, namely from a brother who lives in Ifakara and takes care of one of her children, and from her mother who provides shelter but actually is in need of support due to her old age. Whatever cash Mama B. earns with her food selling business is used up for daily household necessities. She cannot afford to spend money on a net.

12.7.2 The case history of Mama K.

After the death of her husband, Mama K. and her child moved back to her parents home. Her father did not reject her when the relatives of her late husband brought her back. Soon afterwards, however, her father passed away. She then decided to move to the present house.

Interviewer	"What do you do to make a living?"
Mama K.	"My main activity is brewing local beer and selling it. I buy two tins of maize for Tsh 4400. Then I need these special grains for fermentation *(ulezi)* for Tsh 1750. The grinding of the maize at the mill costs TSh 1000. I normally put aside Tsh 8000 for my activities."
Interviewer	"So how much do you get from one brew?"
Mama K.	"I get more than Tsh 12,000. "
Interviewer	"Have you heard about ITN?"
Mama K.	"I have bought one already."
Interviewer	"When did you buy it?"
Mama K.	"January this year [1998]."
Interviewer	"Who uses it?"
Mama K.	"I do with my child."
Interviewer	"Have you re-treated you net since you bought it?"
Mama K.	"Now, there are no mosquitoes during this season. "

The situation of Mama K. is in many ways similar to that of Mama B., but there are small yet important differences. After the death of her husband,

Mama K. also had to move back to her parents; and her mother is now also an old widow. However, unlike Mama B., she has only one child to look after, and she has a profitable business which allows her to put money aside. From these small profits she was able to buy an ITN and she uses it with her child. Although she could afford it, she had not re-treated her net in the seven months since she bought it. She did not see the necessity of doing so during the season with few mosquitoes.

12. 8 Under fives, changing household arrangements and ITNs

Small children were the main target group of the KINET project. During the first round of interviews in the Lukolongo hamlet, 97 households (65 percent) had a child under five. 14 percent of these households did not have a net, 62 percent had a local net and 24 percent had an ITN. This means that most households which had purchased an ITN (n=28) actually had a child under five (n=23), and it was usually the parents and the smallest child who slept under the net.

If parents have several small children but only one net, they faced a dilemma. As one woman explained:

> "...it is true that children aged three, four or five years suffer from mosquitoes. They suffer because they cannot sleep. I am not the one who buys the net. My husband buys the net and decides. What he sees is that if he, I and the youngest child sleep under a net, the other children still cry the whole night because they are bitten by mosquitoes. It is the father who purchases the net, and he decides. I am the mother and cannot decide for the father even once. If we have a net, it cannot go to the other children because he would say: Now you want the youngest baby to be bitten by mosquitoes."

> "You know the problem goes like this: This year a pregnancy, next year a baby. When you clear the farm, you are pregnant; in the rainy season, when mosquitoes are plenty, you have a new baby but there is nothing to sell. Even if the father of the children is present, what can he do? You plan to buy a net after harvest. Then you have one net and three children; one is five years, the other is two and the little one is three months. Now can you have all three of

> them plus yourself and the husband in the same net? The answer is no; it is not possible. I have to put them separately. ..."

In this case, the husband could hardly afford to buy one net, and two nets seemed out of the question. He reasoned that he would rather not get a net than disadvantage some of his children. Other fathers with several children already owned an old net. If they bought an ITN, they used it for themselves, their wife and the youngest child and gave the old net to the other small children.

However, as the two case histories of widows have already shown, household arrangements may change due to death of a spouse, separation or divorce. This came out clearly during the follow up study in the Lukolongo hamlet. Six out of thirty households broke up during the observation period, and seven households had taken in grandchildren from split homes.

If households broke up, it was often the grandparents who ended up looking after small children, while their son or daughter moved in with a new partner or went away to search for money. Several of the female headed households in the Lukolongo sample were actually run by a widowed grandmother, and it depended largely on her economic skills and activities whether she bought an ITN for her grandchildren or not. In one case, the grandmother received money for an ITN from her son, the father of the children, who had married for the fourth time and now lived with his latest wife.

In two cases, women actually broke the rules and took the ITN with them, when they left. Their husbands tried but found it difficult to get the net back. In another case, it was the husband who moved out with the net and set up a new household with another woman.

12.9 Conclusions

The household plays an important role in day-to-day health production (Berman et al. 1994). However, recent research in Dar es Salaam, the most urbanised area of Tanzania, has shown that health practice can be organised in many different ways on the household level (Obrist van Eeuwijk 2000). It has to be examined for each health activity whether it is organised within or across households. This also applies to malaria control. Recent research in Ifakara, a rural area in southern Tanzania, for instance, has shown differences in the ways in which gender and kinship structure the social organisation of treatment-seeking for mild and complicated malaria (Hausmann Muela 2000).

The present study was conducted in the same rural area and examined household dynamics with a focus on one particular malaria control technology: insecticide-treated nets (ITNs). This health activity differs from treatment seeking in that nets not only have to be acquired but should become part of the basic household equipment which is used and maintained in daily life. Mosquito nets should become a fixture in local households.

Underlying this idea is the ideal of the household as a stable residential unit formed by a husband, his wife and children who live together until the children get married and set up their own households. The findings of this study have shown, however, that this ideal rarely corresponds with the local reality, at least in this part of Tanzania. Living arrangements often change. Adult men and women set up a household, have children, get separated due to death, migration or conflict, and form new residential units with partly the same, partly other people. Children move between and grow up in different households. Single relatives get temporarily attached and transform nuclear into extended households.

It becomes important therefore to see ITNs as a property, a material thing that can be purchased, owned, moved and taken away. The data of this study underline that net acquisition, ownership and use is closely linked up

with household headship. Research in Dar es Salaam has shown that headship is closely, but not only, linked with the economic capacity of household provision (Obrist van Eeuwijk and Minja 1997). Even if women increasingly generate their own income and contribute to household provision, male headship prevails as the dominant gender model and attributes decision making authority to the husband. These rules also guided the acquisition, ownership and use of mosquito nets in the rural area, where the present study was carried out. If there was a husband in the household, he was considered as the head in the sense of main breadwinner and decision-maker and considered responsible for acquiring an ITN. If he bought a net, he owned it, he could move it or take it away, for instance when he went fishing or hunting. He could also decide which household members should sleep under which net. In most cases, the husband, his wife and the smallest child would sleep under the ITN. The other children might be protected by a local net, if one was available. Even if the wife earned an income, she did not use it to buy an ITN. After separation, the ITN - like the house and other items procured by the husband - belonged to him, or, after his death, to his relatives. A few women left the household with the ITN but this was seen as breaking the rule.

A study in Benin suggested that earning an income - even if it was lower than that of their husbands - enabled women to purchase nets at their own will (Rashed et al. 1999:1003). For married women in the present study, the relationship between earning a small income and net ownership seems more complicated because male headship implies authority and decision making power. In the interviews, women with small children commonly reported that the staff of the Mother and Child Health clinic had strongly advised them to get an ITN. Married women commonly passed this message on to their husbands because men make the final decision on whether or not to get a net. If, however, women themselves

were the head of a household, earning money became the most critical factor in net ownership.

The findings of this study have important implications for policy making. ITNs should be promoted as goods which should move with small children. Moreover, while earning an income would enable especially women who head their own households to purchase ITNs at their own will, married women could be best supported by promotional messages and activities which take their husbands into account.

PART IV DISCUSSION OF THE STUDY

Chapter 13 Discussion and recommendations

13.1 Malaria control and Insecticide Treated Nets

Malaria remains a challenge of research and implementation (see Chapter 1). Over the past decades, malaria control has advanced in various fields ranging from innovative approaches in vaccine development and testing, over refined molecular techniques for understanding immunity, search for new drugs, to promotion of prevention transmission control measures. Nevertheless, malaria continues to be one of the leading health problems. To find an effective malaria vaccine remains the great hope for malaria control and although much progress has been made, "the hope for having a vaccine that can be used in public health programmes is still far away" (Tanner 2001:214).

Under these circumstance, Insecticide Treated Nets (ITNs) present an attractive option to complement the main malaria control strategy based on early diagnosis and prompt treatment, especially in problematic areas where parasites have become resistant to anti-malarial drugs and the access to health services and proper medication is limited. In controlled trial conditions, ITNs have been shown to reduce clinical malaria episodes by 48% and to save about 6 lives out of every 1000 children protected in the age group 1-59 months every year if they are properly and regularly used (Lengeler, 1998).

While efficacy defined as the number of clinical cases of malaria episodes or deaths averted by an ITN intervention in a given population can be calculated from randomised controlled trials, it remains problematic to translate efficacy recorded under trial settings into sustained effectiveness under programme conditions (Lengeler and Snow 1996). More research is needed on the effectiveness of ITNs under real life conditions in endemic areas, where political, social, cultural and

economic factors influence the routine utilisation and regular re-treatment of this tool. At present, large-scale programmes and projects are underway which address the issue of sustainability, especially operational issues of delivery, distribution and use of the nets (Tropical Disease Research 1997, WHO 1999).

13.2 Social science approaches to research on malaria and ITNs

The need for a better understanding of social, cultural and economic issues affecting the delivery, distribution and use of ITN has become increasingly recognised. Quantitative survey research asking a predetermined series of questions in the exact same way of every respondent has been used to measure Knowledge, Attitude, Beliefs and Practices (KABP) relating to malaria. This type of survey research has strengths and weaknesses (Hudelson 1994:5). It is attractive for various reasons:

- It allows statistical inference from relatively small samples to large populations;
- Relationships between variables can be assessed and measured;
- Surveys are fairly easy to design and quick to implement; and
- Results from standardised surveys can be compared across periods or regions.

On the other hand, it entails a number of problems:

- Respondents may misunderstand the questions;
- Answers may not be truthful for fear of negative consequences or in hope of benefits;
- People may simply say what they presume the interviewer wishes to hear.

To improve the internal validity of data on people's views and practices, qualitative research informed by the theory and methodology of

anthropology provide a valuable alternative to KABP surveys, also in research on malaria control (Agyepong et al. 1995). Such an approach studies people's knowledge and practice relating to malaria as particular interpretations in a particular locality. It can contribute substantially to the understanding of the logic and the social interactions within which ideas about transmission, prevention, diagnosis and treatment of malaria are grounded. This information plays a significant role in helping health promoters and programme managers to come up with a more effective way of designing and implementing control programmes.

Until now, most qualitative research on malaria focused on existing local knowledge and practices relating to malaria, its treatment, and preventive measures. A central issue in studies on ITNs was to identify whether local people recognise the link between mosquitoes and malaria (see Chapter 2). People's awareness of the role of malaria-transmitting mosquitoes forms, of course, a crucial part in the promotion of nets as a tool to prevent malaria. Applied research is usually carried out in preparation of an intervention in order to identify gaps in relation to biomedical knowledge on malaria and to develop locally adapted strategies for the promotion and implementation of ITN technology.

13.3 From a static to a dynamic view

Drawing on these approaches, the present study applied anthropological theory and methodology to investigate social and cultural aspects of ITNs within the framework of the Kilombero Treated Net Project (KINET) in southern Tanzania. It developed, however, an innovative approach because it shifted the focus from a static to a dynamic view of local knowledge and practice.

Unlike previous studies which aimed at identifying "barriers" in the sense of "lack of knowledge" and "holding on to wrong beliefs", this approach emphasises social and cultural dynamics in the generation,

communication and interpretation of knowledge. Knowledge, in other words, is seen as embedded in interpretive practices of people who interact with one another and the natural world. Not the individual as knowing subject, but individuals as social actors who interact and communicate with one another are at the centre of interest. People are considered as active participants who talk to each other, who discuss, negotiate, rework, or quarrel about differences in knowledge and practice and often subvert the meanings and issues transmitted through external sources.

Respondents' accounts are learned and constructed in, through and as a part of the business of everyday life. They do not simply fulfil purely theoretical or cognitive functions: they are about *doing* as much as about *knowing* (Jenkins 1992:69). In other words, to understand what people know, it is important to examine what they do, and vice-versa.

Guided by these theoretical concepts, the study first examines not only the knowledge and practices people have but also the knowledge they seek in relation to malaria and malaria control (see Chapter 9). This part of the study was carried out during the formative stage of the KINET project and contributed to the development of the IEC campaign. Unlike many previous studies the investigation does not end here; it moves on to examine social and cultural dynamics during the implementation stage.

In a second step, it systematically inquires into the interface between knowledge and practice which has been produced locally and knowledge and practice which was brought to the area by the project. At the centre of this investigation are people who work for and respond to the KINET project. The social interactions described are grounded in one particular locality but correspond with experiences in neighbouring villages. The aim was to "keep an ear on the ground" and to feed information back into the project for a continuous improvement of the intervention.

In the third step, attention shifts to gender models and gender relations, their expression in local definitions of headship, to links between headship and net ownership and household dynamics. It draws attention to the social dynamics involved in the acquisition, ownership and use of ITN, and more generally, to the mobility of people and nets, and the temporary nature of household arrangements. Some of these findings were again fed back into the intervention process, others will be useful for future planning and implementation of ITN interventions.

13.4 Study design, data collection and analysis

Field research was carried out in two stages which can be characterised as formative research (July 1996 to June 1997) and ethnographic monitoring (July 1997 to March 1999). Formative research consisted of meetings in 18 villages, a three-months ethnographic study in two villages, and a survey of four other villages. The ethnographic monitoring was carried out in yet another village.

Such a multi-site design differs, of course, from conventional ethnographic field research where the anthropologist stays in one particular place for an extended period of time, usually at least one year, to reach an in-depth understanding of the inner workings of that particular community. The aim of this applied research was different. It aimed, on one hand, at gaining a broader view of people's knowledge and practices in various parts of the project area, on the other hand at gaining deeper insights in a particular site to monitor social processes, namely interactions between the project and villagers, people's responses to programme implementation and gender relations affecting these responses within and across households.

Put differently, the present approach goes beyond the usual social science input during the formative or preparatory stage of the project cycle. Many ITN programmes and projects have put much effort - and invited social scientists to give inputs - into the development of locally

appropriate tools, promotional and implementation strategies. After that, the intervention was carried out, and at the end, quantitative indicators were used to measure the health impact. Villagers' responses during the intervention phase and other social processes affecting the distribution, delivery and use of nets have not been a subject of investigation.

13.4.1 Formative research

Village meetings

Meetings were held in 18 villages selected for Phase I of the project. A question guide (see Appendix 1) was used to systematically collect background information. Questions covered general aspects like the ethnic composition of villages or people's main economic activities. More specifically, they inquired into village leaders' opinions on malaria as a health problem, available methods of preventing mosquitoes and/or malaria, potential distribution channels for ITN and appropriate ways to implement promotional activities. The notes of these meetings were analysed by sorting out people's statements according to key topics. In the typical iterative process of qualitative research, this information was then used to develop interview checklists and guidelines for the next sub-study.

The data collected during these village meetings gave first insights but had to be interpreted critically because the project team introduced itself as representing the "expert view" (*wataalamu wa waafya*) and discussed preventive aspects of malaria; most villagers tried to give "correct answers", that is to conform to what they presumed was correct from the health experts' point of view. The meetings did not provide much insight into people's own way of thinking and acting in relation to malaria, that is their own ways of categorising, diagnosing, treating and preventing malaria.

Ethnographic study

To collect data on these topics for the development of the health information, education and communication (IEC) campaign, a short ethnographic study was conducted in two villages. The first village, Katianduka, was actually a neighbourhood of the rural town Ifakara, and was selected because of its vicinity and people's easy access to centralised health care services. The second village, Mofu, was chosen for its remote location; it was assumed that people there had been less exposed to biomedical knowledge and found it more difficult to gain access to health care services.

A combination of qualitative data collection techniques was used, for instance pile sorting, focus group discussions (see Appendix 2), in-depth interviews, and participant observation. The collected data provided deeper insights into people's knowledge of malaria and related illnesses, treatment practices, preventive measures against malaria and mosquitoes, and people's previous experiences with mosquito nets in general and ITNs in particular.

In data analysis, data collected by different methods on the same topic, for instance a local malaria concept, were cross-referenced and then compared. This facilitated the interpretation because the same topic appeared in various contexts highlighting different aspects of the same phenomenon. Such contextualised information helped to clarify specific illness concepts and related practices in detail.

While interviews document verbal accounts of what people know and do about malaria, they should be complemented by participant observation, since people may say one thing in an abstract sense and act very differently in a concrete situation. Also, direct observation often gives access to what the research did not ask and the respondent did not reveal in 'official' discourse during interviews. Moreover, participating in social events such as such as burials, traditional dances, traditional

healing practices, wedding ceremonies and other festivities helped to build confidence and gain acceptance in the village.

Village survey

The ethnographic study in these two villages, provided locally defined categories for the development of a semi-structured questionnaire (see Appendix 3) for a survey in four villages randomly selected from the 18 project villages of Phase 1. The aim of this sub-study was to assess the distribution of the malaria related concepts and preventive measures identified in Mofu and Katianduka.

The data collected in this survey provided a snap-shot of respondents' demographic characteristics, their knowledge about malaria and related illnesses and their treatment and preventive practices including use of mosquito nets. For data analysis, the responses were aggregated and detached from particular contexts to improve external validity.

13.4.2 Ethnographic monitoring

While the village survey produced cross-sectional data at a given point in time, repeated visits over more than a year in still another village was carried out to capture the interactions and processes surrounding the project implementation in one location over a period of time. What we call "ethnographic monitoring" generated useful insights into the social and cultural processes involved in the acceptance and proper use of ITNs among the villagers.

Household survey

This sub-study was conducted in Mchombe, a rather old and big village with several central structures like a church, a railway stations and a market. To avoid too much of an "urban" bias, the hamlet Lukolongo was selected on the outskirts of Mchombe. It had a population of 789 people and was rather rural in character with homesteads scattered over a wide area. From November 1997 to January 1998, interviews were carried out

to survey all households. In 22 households, people did not consent to give an interview, but in 150 households, the head of household, usually the husband, was willing to respond. In an in-depth interview using a question guide, the heads of household were asked about their own and their spouse's ethnic affiliation, their place of origin, the current household composition, and more specifically about ITN: whether they had heard about ITN, if yes from whom and when; whether they had an "old" net or an ITN, and if they had an ITN, who acquired it, when, where and for what reason, and who presently used it. These and other questions provided detailed information on the acquisition, use and ownership of ITN or on the treatment of "old" nets.

Follow up study

The original plan was to involve 100 out of these 150 households for a follow up study, that is 50 who had bought an ITN by the end of January 1998 and 50 without any net at that particular time. However, only 28 respondents qualified for the first and 21 for the second group. Some household heads further announced that they planned to move to their farm houses for the coming months. Considering these facts and constraints on side of the investigator in terms of time and resources, only 15 households were included in each follow up group.

These 15 households were visited again in July and August 1998. During the second follow up visit in January/February 1999, only 11 of the first and 9 of the second group could be traced again. These difficulties in following households over a period of one year indicate high mobility, a fact which has also been noted in other parts of the project area. The sample size was thus further reduced which means that this part of the research is exploratory. It allowed for a first inquiry into household dynamics and gendered power relations in relation to net acquisition, use and ownership, but not for a generalisation of the findings.

13.5 Reliability and validity

The term reliability refers to the extent to which findings can be replicated, or reproduced, by another inquirer (Denzin and Lincoln 1994:100). Researchers working with qualitative methods can increase the reliability of the data and interpretations by working in a team which explicitly aims at improving the comparability of different interviewers' and observers' conduct and interpretations (Flick 1998:222-224). Working in an interdisciplinary team like the KINET project team further stimulates critical reflections about analytical procedures. However, as in the case of this study, qualitative researchers filter reality through their eyes, ears and minds when they collect their data. Moreover, a person associated with the Ifakara Health Research and Development Centre, better known in the villages STIFU (the Swahili version of the official English abbreviation of Swiss Tropical Field Laboratory), is automatically regarded as *mtaalamu* (an expert) or a *bwana mbu* (mosquito expert). To reduce this bias, I stayed with the villagers during the flooding caused by the El-Niño and got wet while visiting the households. People laughed at me because I was a single woman following them into their farms and to the river.

External validity refers to the degree to which findings can be generalised to other settings similar to the one in which the study was carried out (Denzin and Lincoln 1994:100). In qualitative data, it is just as difficult to assess external validity as it is to measure reliability. In the specific case of this study, external validity could have been improved, especially in the sub-study labelled "ethnographic monitoring", if more resources in terms of time, personnel, money and equipment had been available to follow up a larger sample of respondents. The external validity of data on local concepts relating to malaria as a biomedically defined disease, on the other hand, has been increased by the comparison with similar findings of other studies in the same area (Gessler 1995, Mathies 1998, Hausmann Muela 2000).

Internal validity refers to the degree to which findings correctly map the phenomenon in question (Denzin and Lincoln 1994:100). One approach to increase the validity of qualitative data is to triangulate data collection methods, that is to address research topics through a variety of interviewing and observation techniques (Hudelson 1994:54, Flick 1998:229-230). Confidence in the validity of findings increases when a high agreement in the data and among the respondents is achieved.

Based on these criteria, the internal validity of the data presented in this study is high. Data collection methods were triangulated, and data were systematically examined in terms of consistence and coherence. In the formative research, first ideas on local knowledge and practices relating to malaria were recorded during the village meetings. They were taken up and examined in depth during the ethnographic study in two villages. Contrary to the expectations, the concepts collected in the two villages were very similar, even though the villages differed in terms of access to health care services. This ethnographic research allowed for a careful development of the categories used in the questionnaire which was then administered in four villages. Again, the agreement in the data and among the respondents was remarkable.

13.6 Overall study design

To conduct applied research as a member of the KINET project as well as for an academic degree had its draw backs and advantages. The KINET project had planned for a KABP study, not for extensive ethnographic field research. Resources in terms of time, money and equipment for qualitative research based on a triangulation of methods and informed by anthropological methodology were therefore limited. The double role as project team member and academic researcher also caused difficulties in terms of divided loyalties: being a staff member meant to represent the position of the project, even if conflicting views were put

forward by the villagers; as ethnographer, the aim was to understand and represent the point of view of the villagers, even if it contradicted the biomedical perspective. On the other hand, this double role had its advantages. It not only provided an institutional affiliation, access to the field and financial support, it also provided a unique opportunity to feed back results into the planning and improvement of the ITN intervention.

Because ethnographic research was not included in the original plan of KINET project, its design evolved gradually out of project activities. Although each step can be justified on scientific ground, the overall structure and coherence of the sub-studies could clearly be improved.

More efforts concentrated on formative research, and the findings of this part can be assumed to have a rather high external validity. Since KINET tested social marketing as a new approach to the delivery and distribution of ITN, but also to document and analyse the interaction between local and project knowledge, it would have been useful to repeat the same village survey at least every six months. This would have helped to clarify the question, whether the social marketing and especially the key messages of the promotional campaign had an effect on people's knowledge and practice.

With regard to the second part, the ethnographic monitoring, many insights into processes and the local context have been gained, but they remain rather exploratory in character. Both the internal and the external validity could have been improved, if this sub-study had been integrated into the DSS or, even better, if a comprehensive monitoring system with quantitative and qualitative components had been designed, preferably outside the DSS area.

13.7 Main findings and their implications for future research and interventions

Despite these shortcomings, the study has covered many aspects outlined in the goal and the objectives (see Chapter 4) and produced several interesting findings which have implications for future research and interventions.

Concerning the first objective, the study has documented and analysed local knowledge and practice relating to malaria, its transmission, preventive measures and people's previous experiences with mosquito nets. An important finding in this context is that people clearly distinguish between mild and severe malaria. They use a term derived from biomedicine, namely *maleria*, for the mild form and local terms (*degedege, bandama, homa kali)* for the severe forms. This has consequences not only for treatment seeking as described in other studies (e.g. Hausmann 2000) but also for prevention: to prevent the severe forms thought to be caused by witches and supernatural spirits, amulets *(hirizi)* from healers are considered more important than ITNs. People's response to mosquito nets and especially ITNs remains ambivalent. About half of the villagers (52 percent) owned untreated nets at the beginning of the KINET project, and more than two-thirds (76 pecent) had heard that mosquitoes play a role in malaria transmission. Nevertheless, many villagers doubt the link between severe malaria and mosquitoes and they use mosquito nets primarily against nuisance biting. The seasonal use of untreated and treated nets, as well as rumours about the insecticide *(dawa)* being poisonous *(sumu)* are two key issues which have to be addressed by future research and interventions.

With regard to the second objective, the study has investigated people's knowledge, practice and communication relating to malaria from a dynamic perspective, paying particular attention to the interplay and interface between local and project knowledge and practice. Current

knowledge informing villagers' practices relating to malaria is clearly a result of the interaction of diverse strands of medical traditions. People's queries, critical reflections and arguments underline that they do not just *have* but *seek* knowledge. If knowledge is seen as an ongoing interpretive practice which is embedded in processes of social interaction and communication, interventions can be carefully tailored to capitalise on this insight. The findings of the present study suggest that after the promotional campaign at the beginning of the KINET project, a continuos dialogue has been established between the project and the villagers using different channels of communication. Ethnographic monitoring helped to ensure that people's worries, concerns and questions were regularly fed back into the project. Rather than interpreting such queries and arguments as critique, they should be seen as an opportunity to respond to local needs, to clarify issues and to thus enhance the sustainable delivery, distribution and use of ITNs.

In the final analysis, an ITN intervention can only be sustainable, if people implement it on the household level. It can be argued that especially in areas where malaria is highly endemic, where children suffer most, where mothers/care takers are constantly confronted with disease and death and where they are forced to rely on whatever prevention and treatment methods are available to them, it is of particular importance to conduct a gender analysis of power relations within households (Tanner and Vlassoff 1998).

The third objective of this study, therefore, was o conduct a gender analysis of the acquisition, ownership and use of mosquito nets and ITNs on the household level. Different members of a household contribute to everyday health production, but what they do is, to a large extent, defined by gender. Headship is often used as a proxy in gender analyses of power relations within households. This study has argued that headship is a meaningful analytical category, also in study of gender relations in

the acquisition, ownership and use of ITNs, but admonishes that the meanings of headship has to be investigated in particular settings. According to the dominant gender model in the study area, the husband provides household necessities including mosquito nets, and the wife depends on his good will and economic ability. If women life by themselves or with children and head a household, their own skills to generate income determines their acquisition, ownership and use ofITNs.

These findings not only document the contribution of qualitative research to a better understanding of social and cultural aspects of ITN interventions, they also show that a dynamic view of malaria related knowledge and practice opens innovative lines of inquiry which may contribute to enhancing the effectiveness of ITN interventions.

On the project and programme level, the following issues seem particularly relevant for the future:

- The seasonal use of treated and untreated mosquito nets is a problem which has not yet been resolved and will not be resolved with improved ITN technology which produces permanently impregnated nets. The central message which should be brought across is: "Even one mosquito can kill."
- Unlike treatment in an episode of malaria, an ITN should not only be acquired but become a fixture in the local household. However, the findings of this study indicate that households are not stable units. Since children under five are the main targets in malaria control, the message would be: "ITN travel with small children."
- Related to this point is the fact that children left in the care of grandmothers and widows seem to be particularly vulnerable. This should be considered in the voucher system.

On the district level, three issues should be addressed:

- People in the Kilombero and Ulanga Districts have long been exposed to biomedical knowledge and practice in malaria control. However, some of the messages conveyed by different projects, institutions and services or at different times contradict each other. Efforts should be made to develop a "unité de doctrine".
- A two-way-communication should be established between the villages and the district headquarters. The recurrent worries and concerns voiced by local people should be used to formulate simple yet correct health education messages.
- The KINET project has shown that people in the villages can be reached through various channels. According to the findings of this study, local experts like people considered representatives of an ITN programme and MCH staff are particularly influential. They should be regularly retrained to promote key messages.

On the level of national policy making, the following issues should be considered.

- The problem of re-treating nets will soon be resolved by improved technology. However, rumours about the insecticide *(dawa)* used in net treatment being poison *(sumu)* flare up now and again in different parts of the country. These rumours should be systematically abated in national campaigns.
- Messages on malaria and ITN should be carefully tailored to knowledge and practice existing in particular localities and, at the same time, enforce correct information from a biomedical point of view. Resources should be allocated for the development of systematic and coherent IEC campaigns guided by the principle of integrating local and public health perspectives.
- Findings of this study point to the fact that once again it is the mothers and female caretakers who are held responsible for taking action although most of them neither have the authority nor the resources to

do so. It is essential to call fathers to their responsibility in protecting their children against malaria. A simple message would be: "A good father makes sure that is small children sleep under a treated mosquito net."

These recommendations may contribute to improve ITN interventions and thus increase the effectiveness of this promising option in current malaria control. Many more social and cultural aspects affecting operational issues in the delivery, distribution and use of ITN could and should be considered. This study has hopefully directed attention to the usefulness of such approaches.

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Appendix 1 Question guide for village meetings (Swahili version)

Mwongozo wa majadiliano kususu maradhadhi yanayosumbua katika vijiji 18katika eneo la mradi awamu ya kwanza (Julai 1996-Augosti1996)

Majaliano na viongozi katika mikutano vijijikwao

1) Wanakijiji wanajihusisha na shughuli gani za kiuchumi hapa kijijini?

2) Ni maradhi gani yanayosumbua zaidi hapa kijijini?

   a) Kama ungepewa nafasi ya kutoa uamuzi kuhusu magonjwa matatu muhimu yanahitaji kushughulikiwa ungetaja yapi?

   b) Ni wakati gani katika mwaka magonjwa haya yansumbua zaidi?

   c) Je ni kundi gani la watu linalosumbuliwazaidi na magonjwa haya?

3) Kwa kawaida wanakijiji wanatumia njia gani kujikinga na maradhi haya?

4) Je wanakijiji wangetoa mchango gani katika kushirikiana na mfadhili ili kutatua tatizo hilo hasa kwa upande wa kinga?

5) Je mmewahi kusikia kuhusu vyandarua venye dawa kutumika kama njia madhubuti ya kinga kwa upande wa maleria?

   a) Kama ndiyo mmesikia nini hasa kuhusu vyandarua hivi?

   b) Mlisikia wapi kwa mara ya kwanza na ni nani alizungumzia swala hili?

6) Je ni njia gani zinaweza kutumika katika kuhakikisha wanakijiji wanapata vyandarua venye dawa katika mtiririko mzuri bila kijiji kuingia gharama kifedha, muda na hata gharama kiusalama endepo vitafika kijijini?

7) Je ninyi kama viongozi wa kijiji mngeshauri zilchukuliwe hatua zipi ili kila mwanakijiji anyepata nafasi kifedha anunue kwa wakati wake bila kukwamishwa mfano, pengine anayeuza hayupo kutokana na majukumu mengine?

8) Ni sehemu gani zinazoweza kutumika kwa kuuzia hivyo vyandarua vyenye dawa kwa mfululizo wa miaka minne na zaidi tangu asubuhi hadi jioni ili wanakijijiwapate huduma hiyo wakati wote wanapohitaji?

Appendix 2 Question guide for focus group discussions in short ethnographic study (Mofu and Katiandiuka)

Mwongozo wa hojaji katika vikundi vya majadiliano kuhusu ufakamu wa maleria na maradhi husika

(Septemba 1996-Desemba 1996)

Majadiliano na wanakijiji -Katindiuka, Mofu, (Mchombe)

Utangulizi na kujitambulisha:

Tarehe:

Kundi namba:

Kitongoji:

Kitongoji:

Jinsia na rika

Kijiji:

Maelezo juu ya washiriki katika majadiliano

Nambari	Jina la mshiriki	Dini	Kabila	Elimu	Kazi	Idadi ya watoto

Maswali

1 Ni maradhi gani yanayosumbua zaidi katika eneo hili?

2 Katika maradhi yote yaliyotajwa je yanaweza kupangwa katika makundi kulingana na umuhimu?

3 Katika makundi haya ni kundi gani linasabisha vifo vingi kwa watoto?

4 Je ni dalili zipi muhimu katika kufahamu mtoto anaumwa na mojawapo ya magonjwa haya?

5 Je maradhi haya yanasababiswa na nini hasa?

6 Watu wanatumia njia gani katika kujihami na maradhi haya?

7 Kwa kawaida vyandarua huwa vinatumika kipindi gani na kwa sababu ipi?

8 Katika familia ni nani analala kwenye chandarua?

9 Kwa vyandarua vilivyopo hapa kijijini vimepatikana wapi?

10 Je mmewahi kusikia kuhusu vyandarua vyenye dawa?

Appendix 3
Semi-structured questionnaire for village survey

QUEST.**1**

DODOSO KUHUSU UFAHAMU NA TABIA ZA JAMII JUU YA

MAGONJWA YA WATOTO NA NJIA ZA KUJIHAMI

Kijiji	
Kitongoji	
Nambari ya Kaya	
Tarehe ya mahojiano	
Balozi	
Nambari ya mtu	
Jina lako nani	
Hojaji imekamilika	
Imepitiwa na	

KUMBUKA KWAMBA 1=NDIYO 2=HAPANA 8=SIJUI 9=HAIHUSIKI

Maoni ya Mhojaji

Andika kitu chochote ambacho kinasadia katika kuielewazaidi hiyo familia uliyoihoji wakati unapohoji Kwa mfano labda walikuwepo watu wengine wakati ulipokuwa unaongea na mhojiwa jinsi alivyokuwa akijibu maswali yako au kama alikuwa na wasiwasi katika kujibu maswali yako. Maswali yapi ambayo hakupenda kujibu yaandike ili tuweze kuyabadilisha.

_____

_____

_____

_____

A KIPENGELE CHA KWANZA_TAARIFA KUHUSU MHOJIWA

1 Hali ya nda

1 =Nimeolewa/Nimeowa
2 Sijaolewa/Sijaoa
3 =Tumetengana
4 =Tumetalikiana
5 =Mjane
6 =Uchumba

KAMA JIBU NI = 1 ULIZA NI MUME/MKE WA NGAPI

KAMA JIBU NI = 7 ULIZA NI MCHUMBA WA NGAPI

2 Wewe ni kabila gani?

1 =Mndamba
2 =Mpogoro
3 =Mndwewe
4 =Mhehe
5 =Mbena
6 =Mngoni
7 =Nyingine

Kama jibuni 7Taja_____

3 Wewe ni dini gani?

1 =Muislamu
2 =Mluteri
3 =Katoliki
4 =Sina dini
5 =Nyingine

Kama jibuni 5 Taja_____

4 Je unaweza kusoma na kuandika?

1 = Ndio
2 = Hapana

5. **Kama ndio tafadhali mwombe asome kadi uliyonayo**

1= Anasoma bila shida kabisa
2= Anasoma bila shida
3= Anasoma kwa shida kidogo
4= Anasoma kwa shida kabisa
5= Hawezi kusoma

6a Mume/Mke/Mchumba wako ni kabila gani?

1 =Mndamba 5 =Mbena
2 =Mpogoro 6 =Mngoni
3 =Mndwewe 7 =Nyingine
4 =Mhehe

Kama jibu ni 7 Taja_____

6b Mke/mchumba/mume wako ni dini gani?

1.=Muislamu 3 =Mkatoliki
2 =Mluteri 4. =Hana dini 5 =Nyingine

Kama jibu ni 5 Taja_____

7a Kama ana mchumba/mume/mke mwingine ni kabila gani?

1 =Mndamba 4 =Mhehe
2 =Mpogoro 5 =Mbena
3 =Mndwewe 6 =Mngoni 7 =Nyingine

Kama jibu ni 7 Taja_____

7b Kama ana mchumba/mume/mke mwingine ni dini gani?

1= Muislamu 2 =Mluteri 3 =Mkatoliki
4= Hana dini 5 =Nyingine

Kama jibu ni 5 Taja_____

B HALI YA AFYA

8 Mara ya mwisho mtoto wako mdogo alipougua homa ulimpa huduma gani?

1=Nilimpa vidonge	2=Nilipooza joto la mwili
3=Nilimpa dawa za kienyeji	4=Sikumpa huduma yoyote
5=Sijui	6=Nyingine

Kama jibu ni 6 Taja_____

KAMA JIBU NI 4 NENDA SWALI NAMBA 10

9a Kama ulimpa mtoto vidonge, vidonge gani?_____

9b Ulipatawapi?_____

9c Kama ulinunua ilikuwa kiasi gani _____

9d Ilikuwa lini_____

10 Je mtoto alipona?

1=Ndiyo 2=Hapana

KAMA JIBU NI NDIYO NENDA SWALI NAMBA 12

11 Kama mtoto hakupona ulifanya nini?

1=Nilimpeleka Kituo cha afya /zahati
2=Hospitali kubwa
3=Nilimpeleka kwa mganga wa kienyeji
4=Wakina mama wenye ujuzi
5=Kingine

Kama jibu ni 5 Taja_____

12 Ulishauriana na nani kuhusu hali ya mtoto alipougua?

1=Mume/Mwenzangu
2=Mke/mwenzangu
3=Mkwe wangu wa kike/kiume
4=Ndugu wa mume 5=Ndugu zangu
6=Rafiki
7=Jirani
8=Niliamua mwenyewe
9=Wengine
5=Kingine

Kamani=3,4,9 Taja ni nani_____

13 Ni vitu gani vinavyosababisha vifo vingi kutokea kwa watoto katika eneo hili ?

1=Homa kali	4=Bandama
2=Degedege	5=Malaria
3=Chemchem	6= Kuharisha na Kutapika
7=Upungufu wa damu	8=Kifafa
9=Sijui	10= Nyingine

Kama jibu ni 10 Taja_____

14 Kati ya maradhi hayo uliyotaja hapo juu je utawezaje kutofautisha/ dalili**?**

KUMBUKA KWAMBA 1=NDIYO 2=HAPANA 8=SIJUI 9=HAIHUSIKI

==========

Homa Kali/			**Dalili**			**Sababu**
		Kama umemsomea			Kama umemsomea	
1 =Joto kali la mwili			1=Maleku			
2 =Kutapika			2=Malaria			
3 =Kukohoa			3=Mbu			
4 =Kusitukasituka			4=Nyingine			
5 =Mwili kukosa nguvu						
6 =Nyingine						

Kama jibu ni 6(dalili) Taja_____

Kama jibu ni 4(Sababu) Taja_____

15 Kati ya watoto wako kuna aliyewahi kuugua homa kali?

1=Ndiyo 2 2 =Hapana

16 Unatumia njia gani ili watoto wasipate homa kali

1=Kuchoma pumba ____ ____

2=Kuchoma mafumbesa ____ ____

3=Dawa za kienyeji ____ ____

4=Neti ____ ____

5=Vidonge

6=Nyingine

Kama ibu ni 5 Taja_____

Kama jibu ni 6 Taja_____

==========

Degedege **Dalili** **Sababu**

==========

		Kama umemsomea			Kama umemsomea
1 =Joto kali la mwili	____	____	1=Mdudu	____	____
2 = Mwili kukauka	____	____	2=Upepo mbaya	____	____
3=Macho kugeuka	____	____	3=Degedege	____	____
4=Mdomo kwenda upande	____	____	4=Homa	____	____
5=Kusitukasituka	____	____	5=Maleria	____	
6=Kutetemeka	____	____	6=Kipepeo	____	____
7=Kufunga choo/mkojo	____	____	7=Nyingine	____	____
8=Nyingine	____	____			

Kama jibu ni 8(dalili) Taja_____

Kama jibu ni 7 (sababu)Taja_____

17 Kati ya watoto wako kuna aliyewahi kuugua degedege?

1=Ndiyo 2 2 =Hapana ____

18 Unatumia njia gani ili watoto wasipate degedege?

		Kama umemsomea
1=Kumfunga mtoto dawa	____	____
2=Kilala	____	____
3=Kumpa mtoto ngambi	____	____
4=Vidonge	____	____
5=Nyingine		

Kama jibu 4 Taja_____

Kama jibu 5 Taja_____

==========

Bandama **Dalili** **Sababu**

==========

		Kama umemsomea			Kama umemsomea
1 =Joto kali	____	____	1=Maleku	____	____
2 =Kuvimba bandama	____	____	2=Malaria	____	____
3=Kuwa mweupe	____	____	3=Homa	____	____
4=Choo povu la njano	____	____	4=Mbu	____	____
5=Kucheua njano	____	____	5=Mila	____	
6=Nyingine	____	____	6=Nyingine	____	____

Kama jibu ni 6(dalili) Taja_____
Kama jibu ni 6(Sababu) Taja_____

19 Kati ya watoto wako kuna aliyewahi kuugua Bandama

1=Ndiyo 2 2 =Hapana ____

20 Unatumia njia gani ili watoto wasipate Bandama

		Kama umemsomea
1=Kuchoma pumba	____	____
2=Kuchoma mafumbesa	____	____
3=Kilala	____	____
4=Vidonge	____	____
5=Neti	____	____
6=Nyingine	____	____

Kama jibu ni 4 Taja_____

Kama jibu ni 6Taja_____

==========

Chemchem **Dalili** **Sababu**

==========

		Kama umemsomea			Kama umemsomea
1= Homa za vipindi	____	____	1=Malaria	____	____
2=Joto kupanda	____	____	2==Mbu	____	____
3=Kutapika	____	____	3=Homa	____	____
4=kukosa hamu ya kula	____	____	4=Nyingine	____	____
5=Kupata baridi ghafla	____	____			
6=Nyingine	____	____			

Kama jibu ni 6(dalili) Taja_____

Kama jibu ni 4(Sababu) Taja_____

21 Kati ya watoto wako kuna aliyewahi kuugua chemchem

1=Ndiyo 2 2 =Hapana ____

22 Unatumia njia gani ili watoto wasipate chemchem

		Kama umemsomea
1=Kuchoma pumba	____	____
2=Kuchoma mafumbesa	____	____
3=Kilala	____	____
4=Vidonge	____	____
5=Neti	____	____
6=Nyingine	____	____

Kama jibu ni 4 Taja_____

Kama jibu ni 6 Taja_____

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Maleria **Dalili** **Sababu**

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		Kama umemsomea			Kama umemsomea
1=Kutapika njano	____	____	1=Vidimbwi vichafu	____	____
2=Kuharisha	____	____	2=Kazi ngumu	____	____
3=Mwili kuuma	____	____	3=Homa	____	____
4=Kusitukasituka	____	____	4=Mbu	____	____
5=Kucheua njano	____	____	5=Nyingine	____	____
6=Kushindwa kula	____	____			
7=Joto kupanda/homa	____	____			
8=Nyingine	____	____			

Kama jibu ni 8 (dalili)

Taja_____

Kama jibu ni 5 (Sababu) Taja_____

23 Kati ya watoto wako kuna aliyewahi kuugua Maleria

1=Ndiyo 2 2 =Hapana ____

24 Unatumia njia gani ili watoto wasipate Maleria

		Kama umemsomea
1=Kuchoma pumba	____	____
2=Kuchoma mafumbesa	____	____
3=Kilala	____	____
4=Vidonge	____	____
5=Neti	____	____
6=Nyingine	____	____

Kama jibu ni 4 Taja_____

Kama jibu ni 6 Taja_____

C KUHUSU VYANDARUA

25 Je kuna chandarua katika nyumba yako?

1=Ndiyo 2 2 =Hapana ____

KAMA HAPANA NENDA SWALI NAMBA 27

26 Kama ndio una vyandarua vingapi?

|___|

27 Kama hakuna chandarua kwenye nyumba yako ni kwanini?

		Kama umemsomea
1=Uwezo mdogo	|___|	|___|
2=Ukubwa wa familia	|___|	|___|
3=Chandarua ni kitu cha musimu tu	|___|	|___|
4=Hata wenye vyandarua wanaugua maleria	|___|	|___|
5=Mbu watakuuma ukiwa nje ya chandarua	|___|	|___|
6=Havipatikani karibu	|___|	|___|

7 Nyingine

Kama jibu ni 7 Taja_____

28 Ulipata wapi**?**

	Kama umemsomea
1=Dukani mjini	|___| |___|
2=Dukani St.Francis	|___| |___|
3=Nilipewa zawadi 3=Kilala	|___| |___|
4=Nyingine	|___| |___|

Kama jibu ni 1 Taja Shilingi_____
Kama jibu ni 1 Taja Lini (mwaka)_____
Kama jibu ni 2 Taja Shilingi_____
Kama jibu ni 2 Taja Lini (mwaka)_____
Kama jibu ni 4 Taja_____

29 Nani analala kwenye chandarua

	Kama umemsomea
1=Mama na mtoto mchanga	
2=Baba peke yake	
3=Baba na Mama	
4=Baba na watoto wengine	
5=Mama baba na mtoto mchanga	
6=Watoto wakubwa	
7=Watoto wadogo	
8=Wengine	

Kama jibu ni 8 Taja_____

30 Chandarua Kinasaidia nini

	Kama umemsomea
1=Kuondokana na kero ya mbu	
2=Using'atwe na wadudu wengine	
3=Usiugue maleria	
4=Kupata usingizi mtamu	
5=Mengineyo	

Kama jibu ni 5 Taja_____

31 Unafikiri ipi ni sababu muhimu zaidi

	Kama
1=Usiugue maleria	
2=Kuondokana na kero ya mbu	
3=Using'atwe na wadudu wengine	
4=Nyingine	

Kama jibu ni 4 Taja_____

32 Wewe huwa hasa unatumia chandarua wakati gani?

1=Wakati wa mbu wengi ____

2=Siku zote kwa mwaka mzima ____

3=Mwezi wa tatu,nne,tano na sita ____

4=Wakati mwingine ____

Kama jibu ni 4 Taja_____

33 Kwa nini watu hawatumii chandarua siku zote/ kwa mwaka mzima ni

1=Hakuna mbu wakati wote ____

2=Vyandarua vinaongeza joto wakati huo ____

3=Kwa sababu kitachakaa ____

4=Nyingine ____

Kama jibu ni 4 Taja_____

34 Umewahi kusikia kuhusu uwezekano wa kuwekea chandarua dawa?

1=Ndiyo 2 2 =Hapana ____

35 Kwa mara ya kwanza ulisikia kutoka wapi?

1=Rafiki 2=Jirani 3=Hospitali St. Francis ____

4=Duka la madawa St.Francis 5=Kwenye mradi wa KINET ____

6=Kwenye mradi mwingine ____

7=Pengine ____

Kama jibu ni 6, 7 Taja_____

36 Umesikia vyandarua hivi vyenye dawa vinafanya nini?

	Kama umemsomea
1=Vinaua mbu	
2=Vinafukuza mbu	
3=Vinazuia mbu wasiingie ndani ya nyumba	
4=Vina matatizo kwa afya	
5=Vinazuia maleria	
6=Nyingine	

Kama jibu ni 6 Taja_____

37 Umesikia kwamba dawa inayowekwa kwenye chandarua ina madhara gani

	Kama umemsomea
1=Inapunguza nguvu za uzazi	
2=Inasababisha kansa ya ngozi	
3=Inaleta matatizo ya kifua	
4=Nyingine	

Kama jibu ni 4 Taja_____

38 Je kwenye nyumba yako kuna chandarua chenye dawa?

1=Ndiyo 2 2 =Hapana

39 Kama unacho ulikipata wapi?

1=Dukani mjini	
2=Dukani St.Francis	
3=Nilipewa zawadi	
4=Sikumbuki	
5=Pengine	

Kama jibu ni 1 Taja Lini (mwaka)_____

Kama jibu ni 2 Taja
Shilingi_____
Kama jibu ni 5 Taja_____

40 Umesikia kama vyandarua hivi vinahitaji kuwekea dawa tena?

1=Ndiyo 2 =Hapana ____

41 Kama ndiyo Umesikia vyandarua hivi vinahitaji kuwekewa dawa tena kila baada ya muda gani?

1=Miezi 3 2=Miezi 6 3=Kila baada ya kufua ____
4=Miezi 12 5=Nyingine

Kama jibu ni 5 Taja_____

42 Je ungependa kuwa na chandarua chenye dawa?

1=Ndiyo 2 =Hapana ____

Kama ni 1 (Sababu)_____

Kama ni 2 (Sababu)_____

43 Je unafikiri nini kuhusu dawa hii ya kutia kwenye chandarua?

_____

_____

_____

_____

Sahihi ya aliyehoji ____ ____