

# MALARIA CONTROL AT THE DISTRICT LEVEL IN TANZANIA: A CASE OF MUHEZA DISTRICT

*M. Alilio<sup>1</sup>, A.Y. Kitua<sup>1</sup>, K. Njunwa<sup>1</sup>, M. Medina<sup>2</sup>, A. Rønn<sup>3</sup>, J. Mhina<sup>4</sup>, F. Msuya<sup>4</sup>, J. Mahundi<sup>4</sup>,  
S. Whyte<sup>4</sup>, A. Krasnik<sup>5</sup> & I. Bygbjerg<sup>6</sup>*

## Abstract

This paper reviews the effectiveness of District Health Services on malaria control using ten indicators of control activities. These were, changes of malaria incidence overtime; utilization of facility based care services for malaria; patients access to professional advice; trend of treatment failure over time (Sulfadoxine/pyrimethamine and chloroquine); a district malaria control strategy; number of malaria specific training for care providers, presence or absence of health education program on malaria; survival rates of severe cases at the district hospital; number of activities carried out on mosquito control measures; and availability of diagnostic facilities.

Four data sources were used; household interviews with a stratified sample of 1250 respondents from 12 villages. In-depth interviews with all health care providers in the 35 district health facilities and interviews with district health management team members. Review of dispensary and hospital records, systematic observations in the facilities visited, and review of documents and printed/published literature.

Results show unchanged malaria disease burden. The average number of malaria episodes per children under five years, per year in the district, remain more than 3 episodes since 1960s. Comparison of the cases expected in the under-five population with those seen in the district health facilities show coverage rate of 33%, and between 1990-1997 no specific training was provided to health staff on malaria. The findings imply a limited effectiveness of district health services in on malaria control, suggesting a weak process of translating the national malaria goals to activities at the district level.

## Key words

*District health services, malaria control, effectiveness*

## Biographies

Martin Alilio (*B.A., M.Sc, Dip. Trop. Med. Ph.D.*) is a health services research specialist, a Head of Health System and Policy Research at the National Institute for Medical Research, Tanzania.

Andrew Y. Kitua (*M.D., M.Sc, Ph.D.*) is a Malaria and health services research specialist. The Director General for the National Institute for Medical Research, Tanzania.

Marta Medina (*M.D. Dr. Sci.*) is a public health specialist and a head of health services planning and evaluation at Clarity PLC Copenhagen.

Anita Rønn (*M.D. Ph.D.*) is a researcher in the Rigs hospital, specialist in clinical pharmacology.

Mr. Julius Mhina, Fikirini Msuya and Judith Mahundi they work as senior Laboratory technologists in Amani Medical Research Centre, Tanzania.

Professor Susan Whyte (*B.A., M.A., Ph.D.*) is a senior medical anthropologist Institute of Anthropology, University of Copenhagen.

Professor Ib Bygbjerg (*M.D. D.Sc.*) is a tropical medicine specialist and head of Department of International Health, Institute Public Health, University of Copenhagen.

Professor Allan Krasnik (*M.D. M.PH, Ph.D.*) is a health services research specialist and a head of Institute of Public Health - University of Copenhagen.

<sup>1</sup> National Institute for Medical Research, P. O. Box 9653, Dar es Salaam, Tanzania, E-mail: Nimr@twiga.com/Alilio@Hotmail.com, Fax: 255 51 130660, Tel: 255 51 130770/255 51 125085

<sup>2</sup> Clarity PLC, Copenhagen, E-mail: Mim@clarity.dk

<sup>3</sup> Department of Clinical Pharmacology Rigs Hospitalet, Copenhagen, E-mail: Ronn@rh.dk

<sup>4</sup> Institute of Anthropology University of Copenhagen, E-Mail: Susan.Reynolds.Whyte@anthro.ku.dk

<sup>5</sup> Institute of Public Health, Department of International Health, University of Copenhagen, Denmark, E-mail: I.Bygbjerg@pubhealth.ku.dk

<sup>6</sup> Institute of Public Health, Department of Health Services Research, University of Copenhagen, Denmark, E-mail: Krasnik@pubhealth.ku.dk

## Introduction

Malaria occurs throughout Muheza district, north east Tanzania with exception of few pockets in the Eastern Usambara Mountains. It is the leading cause of hospital admissions and contributes to 50% all deaths in children under five years of age at Muheza district hospital. At the village level, fever and malaria combined account for 83% of all deaths in children under five years (1).

*Plasmodium Falciparum* is the main causative agent accounting for more than 90% of all the infections. Determinants of the epidemiology and clinical impact of malaria for Muheza district are transmission and immunity. The transmission depends largely on the favourable ecological conditions (hot and humid and presence of clear water bodies in the lowland and coastal part of the district favourable for Anopheline mosquitoes) and vectorial capacity (2). These conditions are present year-round in most part of the district. Throughout the district and similar to other malaria endemic areas, immunity to malaria varies by age (3). At birth, children have acquired immunity from their mothers. They are not only protected but also can clear infection spontaneously following infective bites. This immunity is lost rapidly within three months and children develop their own immunity slowly over time and are therefore at highest risk of malaria between four and eight months after birth (4). Another study (5) of a Cohort of 169 children between 1-10 years of age show that 60-80% were found malaria positive and each child experience 2-5 episodes of clinical malaria per year.

District Health Services (DHS) have an important role in control of malaria. They can play pivotal in the provision of prompt diagnosis and treatment of cases, prophylaxis for risk groups, provision of health education to the affected communities, coordination of vector control activities and monitoring of epidemics.

### Malaria Control as Part of Primary Health Care Services at the District Level

Following the failure of vertical mosquito control programmes in most countries during 1960s and 1970s, in 1985 the thirty-eighth World Health Assembly adopted a resolution which recommended that the control of malaria will have to be developed as an integral part of primary health care systems at the district level (6). It was agreed that the operational responsibilities for control of malaria should be transferred to and be maintained by general health services at the district level under the guidance of ministries of health. The emphasis being on active detection of cases and prompt treatment. This was to involve the development of approaches and techniques for each district, and possibly each community within the district, based on the stratification of malaria epidemiology. Utilization of locally developed

and appropriate control measures, taking into account not only the technical aspect but also social, behavioural, and economic factors was emphasized (7). Organizational issues to be considered included: (i) better delineation (stratification) of the malaria problem, including a more precise definition of areas with different levels of endemicity, precise definition of populations at risk, and better understanding of the factors influencing the mosquito borne diseases in different situations; (ii) improved understanding of cost effective measures appropriate for different situations, their timing and sequencing; (iii) improved understanding of how technically appropriate measures can be organised and how accepted they are within different community settings; (iv) improved sensitivity on the part of health workers to factors that can enhance job performance including recognition of high-risk situations/populations, selection of measures applicable to different settings and health education; (v) enhancing community participation and thereby improving the quality of the results from measures carried out.

In essence this change of strategy from vertical control program to integrated primary health care approach had wider implications to the organization of primary health care system at the district level. The role of primary health worker for example, within the district was made complicated and more tasks were added. However, due to the low level of training, inadequate remuneration and poor working conditions of primary health workers in most developing countries, this new approach left many questions unanswered. It was clear, that for the strategy to succeed, re-training and re-deployment of primary health workers at all levels was crucial. The training and deployment had to be considered not only in general terms with respect to epidemiology and control of malaria, but also in very specific terms, particularly at the field level, in relation to duties to be carried out for malaria control by health workers. These workers were to support communities attempting to implement malaria control as well as to educate individuals and groups to participate in, and contribute actively (8).

On the basis of this background and malaria's clinical characteristics (acute and life threatening requiring prompt and timely medical attention), it provides an important tracer condition to health services effectiveness, particularly suited to patients utilization of medical services. Studying district health services using tracer conditions such as malaria could yield a vital information on the changes necessary at the organisational level to improve the performance of district health services at all levels. This article presents the results of a study analysing the effectiveness of the district health services in Muheza district regarding malaria control.

## Materials and Methods

### Study Area: Muheza District

Muheza is one of the six districts in Tanga region, north east of Tanzania. The district has about 171 small villages with a population of 275,864. An average village has about 2000 people. The population growth rate of 2.1 % is slightly lower than the national average of 2.8 %. The infant mortality rate is estimated at 101/1000 (9), again slightly below the national figure of 104/1000 (10); the under five mortality is 208/1000 (11).

Malaria is holo-endemic in Muheza with transmission peaking after the rainy season in May and June. Although the pattern of diseases vary greatly in the region, for Muheza district the top five diseases in terms of mortality are: malaria, measles (for children), pneumonia, anaemia and diarrhoea. The order differs slightly with age groups but the most important problem is malaria, fever and malaria combined account for 83%

of all deaths in children under five years (12). The district has 32 dispensaries, 3 health centres and 1 district hospital.

The main economic activity in the district is subsistence farming of food crops which include maize, cassava, rice and coconuts. Main cash crops include oranges, cloves and other spices. Fishing is also common along the shores of Indian ocean. Rainfall ranges from less than 1200mm annually to 3000mm in a few areas. Communication is poor and some roads become impassable during the rainy season (March to April).

### Main components of the study: Effectiveness indicators

The selected DHS effectiveness indicators on malaria control in the Muheza district sources of data are outlined in Table 1. Only public sector performance indicators has been collected.

**Table 1: Summary of Indicators, Data Sources and Sample Sizes**

Indicators	Data Type and Source	Samples Size
1. Malaria incidence	Published literature of studies done in Muheza district between 1960s-1990s	Varied
2. Utilization of services	(a) DHS facility records	A sample of 5 DHS rural facilities
	(b) Questionnaire Interviews	A random sample of 1250 respondents from a stratified (geographical) sample 15 villages
3. Malaria case fatality rates	Teule Hospital Annual Reports (1989-1996)	
4. District malaria control strategy	Interview with members of DHMT Staff in DHS facilities. Workshop discussion	All 6 members of DHMT 178 Staff of DHS facilities 21 workshop participants from the district
5. Training provided to DHS staff on malaria	Review of records in the district office Interview with DHS staff and DHMT members, workshop discussion	All 6 members of DHMT 178 staff of DHS facilities 21 workshop participants from the district
6. Use of professional advice	Questionnaire interview	As in 2b
7. Resistance of malaria parasites to anti-malarial	Literature review of studies done in Muheza District (1960-1990s)	
8. Level of awareness	Questionnaire interview	As in 2b.
9. Vector control activities	As in 5. above	As in 5. Above
10. Malaria diagnosis facilities	Observation with checklist	All DHS facilities (excluding District Hospital)

### Change of burden of disease: Incidence of malaria over time

One of Tanzania's health policy objectives in provision of health services is to reduce disease burden among the Tanzanians (13). In this study, disease burden was estimated by reviewing malaria incidence reported in six separate studies conducted in Muheza between

1967-1995. Incidence of malaria was used as an indicator of the change of status of malaria situation in the district. Diseases incidences are useful indicators of effectiveness of health programmes (14). The studies providing the incidence data on malaria in Muheza are outlined in the Table 2 as follows:

**Table 2: Summary of Studies Reporting Malaria Incidence in Muheza District Between 1967-1995**

Authors	Study Area	Study Period	Age Groups	Main Subjects	Number of Subjects
Clyde, D.F	Muheza	1967	1-15	Malaria epidemiology	350
Lelijveld and Mzoo	Muheza	1970	1-15	Malaria treatment	300
Goosen, Th. J	Muheza (Kicheba)	1975	1-15	Sensitivity Of <i>Plasmodium falciparum</i> to anti-malaria drugs	215
Kilimali et al	Muheza/Tanga	1985	6-18	Sensitivity to anti-Malarial	213
Lymo et al	Muheza	1988-9	1-15	Impact of bed nets on malaria	988
Lemnge	Muheza (Magoda)	1995	1-15	Malaria and filariasis epidemiology	249

#### Coverage: Health service utilization in relation to malaria

Utilization of health services for malaria was estimated on the basis of proportion of children under five years of age in need of service who actually receive it between 1993-1996. The sample was derived from malaria case records in four village communities (Ubwari, Kicheba, Mkanyageni, and Umba) served by DHS. The estimation based on the minimum standard of coverage which in this study was defined as three malaria episodes per child per year. The number of malaria episodes per child per year was obtained from questionnaire interviews (Table 1) in which respondents (N=1250) were asked to estimate the number of episodes each child below five years of age get per one year. The results were also corroborated with two other studies in the Muheza (15, 16). The number of cases are compared to the total population of children under five years of age in each of the four areas (estimated on the basis of 1988 National Census projections). The utilization of services was used to estimate the DHS effectiveness on malaria in relation to service needs and coverage.

#### Coverage: patients access to professional advice

The community access to medical professional advice from the local DHS facilities was assessed as an indicator of effectiveness in terms of coverage. The assessment in relation to use and appropriate sources for medical drugs including anti-malarial was done through questionnaire interview (Table 1). In the interview respondents were asked to mention the source of advice on where to obtain appropriate anti-malarial drugs and how to use them.

#### Aversion of death: Malaria case fatality rates in the district main hospital

Malaria case fatality rates in Teule hospital were calculated as a proportion of persons who die from

malaria each year among all those who were admitted and diagnosed as having malaria (between 1989-1996). The data was retrieved from Hospital's Annual reports. The malaria case fatalities are compared over time as well as with other deaths in the hospital during the same period to assess the changes in malaria case fatality with time and relative to overall hospital death rates. Case fatality rates are used in this study as indicators of effectiveness of DHS in death aversion, giving indication of process quality at the hospital level for terminal and acute cases and indication of performance of referral system.

#### Local Malaria Control Strategy

Development and use of local disease control strategies reflecting local needs and environment has been used as an indicator of effectiveness in most primary care reviews (17). In this study, the review covered approaches and techniques developed within the district to control malaria. The process involved review of district health plan documents. Interviews were also carried out with all 6 members of District Health Management Team, and all 175 staff working within the rural DHS facilities.

#### Training of Health Care Providers

Provision of regular on job-training was considered a part of resource management and is important in health for four main reasons: (i) maintain and improve competence (i.e the combination of knowledge, skills and attitudes) (ii) improve satisfaction among the care providers by reducing anxiety of difficult and unfamiliar cases (iii) Acquaint staff with common goals and strategies (iv) improve community satisfaction with care. Data was obtained from interviews with health workers and the district health management team (Table 1).

### Sulfadoxine/pyrimethamine and chloroquine treatment failures

A number of studies in Tanzania have documented that resistance of malaria parasites to anti-malarials drugs is related to *ad hoc* use and *inadequate monitoring* of use by health care delivery system (18). Development of parasites resistance against anti-malarial is often regarded as an indicator of the extent to which the health services are un-able to monitor and regulate the use of drugs at the community level. In this study malaria rapid onset of the parasites resistance against two main anti-malarials (Sulfadoxine/pyrimethamine and Chloroquine) was used to assess effectiveness of the DHS in its capacity to restrict the use of anti-malarials available. The literature reviewed covers the period between 1970-1996.

### Health Education

Another measure of DHS effectiveness used in this study was the provision of health information to the general public regarding malaria. The process included the review of level of knowledge regarding malaria, causes, treatment and prevention (Table 1). The responses were classified as appropriate or inappropriate on the basis of the list developed for health education by the Ministry of Health and available locally at the district level.

### Vector Control

Vector control activities were assessed as a component of process effectiveness through interview, including staff and DHMT members (Table 1).

### Diagnosis Facilities

The availability of diagnostic facilities was assessed as component of structural effectiveness and was done by visiting (observation) all the 35 rural DHS facilities within Muheza District.

### Results

#### *Change of Disease Burden Over Time: Incidence of Malaria*

Figure 1 shows the incidence (number of episodes per child per year) of clinical malaria in children between 1-15 years in Muheza district 1967-1995; 3.3 episodes per child per year were reported by Clyde D.F (19) in a cohort of 120 children (<5 years of age) followed for 1 year, in another study (20) 3.5 episodes per child per year were reported in a cohort of 161 children of the same age group. In a more recent study (21) found 3.95 episodes per child per year in the same age group analysing a cohort of 998 children followed for 2 years; similar, but slightly higher figures (4.73 episodes) were reported by (22) in cohort of 267 children of the same age group followed for one year. The graph indicates an average of 3.8 episodes per child per year for the whole period covered in the review. The data show an increase in the level of disease burden in the district between 1969-1995 suggesting a limited effectiveness of the *Prompt Diagnosis and Treatment Strategy* currently used for control malaria within the district.

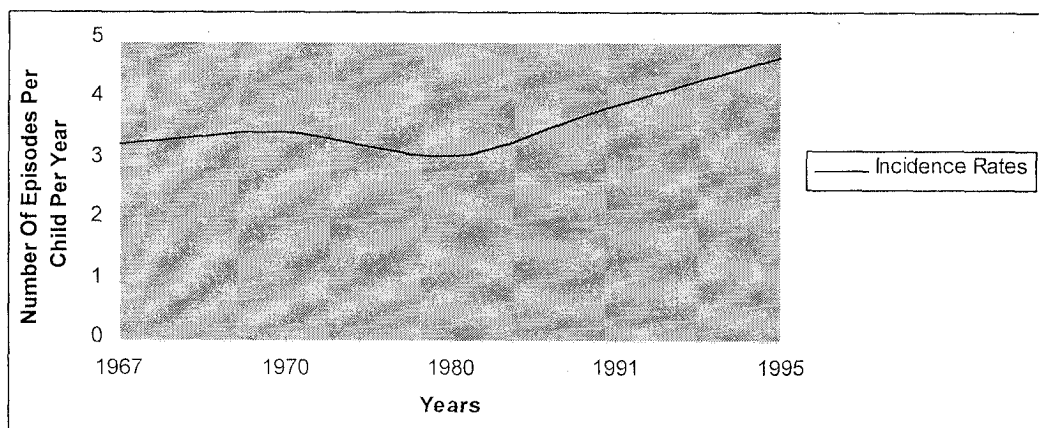


Fig 1: Number of Malaria Episodes Per Child Per Year In Muheza District (Children Under Five Years)

### Health service utilization in relation to malaria

Figure 2 shows the number of children under five year of age who were recorded as having malaria in a sample of four areas (Ubwari, Kicheba, Mkanyageni, and Uмба) in the Muheza district served by DHS. The number of cases are compared to the total population of children under five years of age in the four areas (estimated on the basis of census projection (23). The number of cases

seen in the four facilities is further compared to the number of children of the same age in need of care. The results show that 38% (1993), 36% (1994), 28% (1995) and 32% (1996) of all the estimated number of malaria episodes in children under five years of age were seen in the DHS facilities. The results show an average coverage of 33.1% during the four years reviewed.

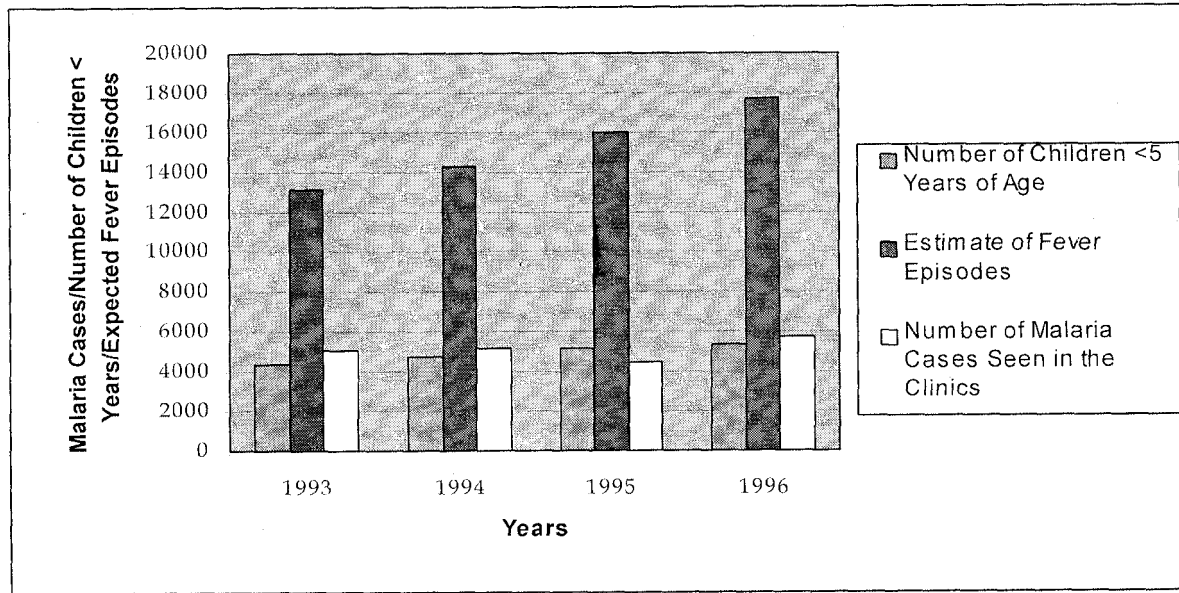


Fig 2: Use of DHS Facilities for Malaria Among the Children Below 5 Years of Age in Four Villages in Muheza District

### Professional Advice on Anti-malarials

Results on the percentage of people who, in the Community Questionnaire Survey, reported using professional medical advices from the DHS facilities on anti-malarials are shown in Table 3. The results show that in the six divisions within the district, a relatively

limited proportion ( median 5% (range 2.5 - 13%) seek professional advice on how to use anti-malarial drugs from the local shops. A minor variation was observed between divisions as shown below with lowest being in the most remote division 2.5 % (Mkinga).

Table 3: Use of Professional Advices by the Local Community (N=1250)

Proportion Respondents seeking advices	Muheza Mjini N=180	Ngomeni N=197	Bwembera N=178	Kiswani N=168	Mkinga 164	Maramba N=192
General medical advice	150 (75%)	168 (84%)	150 (75%)	150 (75%)	147 (73.5%)	153 (76.5%)
Advice on appropriate drug source	20 (10%)	14 (7.0%)	16 (8%)	11 (6%)	12 (6%)	13 (6.5%)
Use of anti-malarial from the local shops	10 (5%)	15 (7.5%)	12 (6%)	7(3.5%)	5 (2.5%)	26 (13%)

### Regulation of drugs use: Development of drug resistance

Regulation of drugs use: Development of drug resistance We reviewed data on the trend in the development of malaria parasites resistance against two main anti-

malarials used in the district, sulfadoxine/pyrimethamine and chloroquine. The results on sulfadoxine/pyrimethamine are shown in Table 4. They show a changing trend with the failure proportion reaching 97% in some areas.

Table 4: Sulfadoxine/Pyrimethamine Resistance in the Muheza District

Year	Area	Percentage of patients without parasitaemia 7 days after initial treatment
1994	Magoda	25
1995	Muheza (Town)	51
1995	Muheza (Town)	40
1995	Magoda	53
1995	Magoda	67
1995	Magila	95
1995	Amani	97
1996	Magoda	3

### Chloroquine Resistance in Muheza District

Resistance to chloroquine in the Muheza was first documented by Clyde (24) reporting a resistance rate of 5%. The same level of resistance was reported in another study (25). In 1970 Levivjeld and Mzoo (26) reported a resistance rate of 10%, later in 1975 Goosen (27) demonstrated that the 10 mg/kg dosage of chloroquine used to treat malaria cases could no longer clear asexual parasitemia and a dose of 20 mg/kg was recommended. In 1985 the median *in vivo* resistance to chloroquine in school children documented by Kilimali (28) was 20%. Later Mutabingwa (29) reported a resistance rate of 80% in infants, 58% in children between 1-5 years, and 50% in children 6-10 years old. The similar results were reported by Rønn (30) showing a resistance rate of 70% in children below 5 years of age. Overall the review shows a relatively rapid development of malaria parasites resistance against sulfadoxine/pyrimethamine and chloroquine between

1960 to 1990. The parasite clearance rate decreased from 75% (1994) to 4% (1996) for sulfadoxine/pyrimethamine.

### Malaria Control Strategy

Table 5 shows an assessment matrix for activities associated with malaria control in the Muheza district. The matrix assess the organizational issues of malaria control in Muheza using an index recommended by WHO (31) for district levels. None of the dispensaries had malaria control guidelines and charts developed by dispensary staff in collaboration with the District Management Teams. Malaria control posters were available in 12 (36) DHS facilities on cause of malaria and common means of control. These posters were developed by Ministry of Health at the national level and no local examples were used. There was no record of any attempts to produce locally developed posters.

**Table 5: Assessment Matrix for Activities Associated With Malaria Control in Muheza District**

<i>Activity/strategy</i>	<i>Measurable Outcome</i>	<i>Tools/Mean of Verification</i>	<i>Number of Activities observed during the study</i>
Delineation (stratification) of the malaria problem, including definition of areas with different levels of endemicity, population at risk, the factors influencing the mosquito borne diseases in different communities.	District guideline for malaria control	Number of health facilities using the guideline	None
Outline of measures most appropriate in different villages and their cost effectiveness, their timing and sequencing.	Manual for DHMT and dispensary staff	Number of health facilities with the manual	None
Training of health workers on recognition of high-risk situations/populations, selection of measures to apply to different settings and health education:	Training of staff	Number of staff trained	None of the staff had received specific job-training on malaria in the past 5 years.
Understanding of how technically appropriate measures can be organised and how accepted they are within different community settings	A chart of showing malaria control approach for each division	Number of health facilities with and using the charts	None of the dispensaries had malaria control charts developed by DHMT. 12 dispensaries had posters on malaria causation and control developed by MOH with no local examples

With exception of Muheza town where during the last 6 years there has been activities related to mosquito source reduction (draining of breeding sites), there were no vector control activities coordinated through DHS during the study period.

### Training of Health Workers

Table 6 presents the results on all types of training provided to service providers in 35 rural DHS facilities in the district. The data covers the period of past the five years (1991-1996) and was obtained from record reviews

as well as interviews of staff in the facilities visited. It was observed that the main area of focus for regular job-training were immunization, family planning, AIDS Control, essential drugs and information system. Out of 178 respondents i.e staff members working in health centres and dispensaries no one had attended on job training specifically related to management and control of malaria. It should be noted here that in terms of disease burden, malaria accounts for more than 80% of all deaths of children below five years of age (33).

**Table 6:** Job-training for Staff Working for District Health Department: Coverage of Training in the Past 5 Years

Course Title/Cadres of staff	Number of Medical Assistants trained (N=21)	Number Rural Medical Aides Trained (N=32)	Number of Maternal and Child Health Aides Trained (N=29)	Total Number of Staff trained	Percentage of the overall staff
Immunization	6	19	23	48	27
Family Planning	7	7	21	35	19.6
Essential Drugs	7	21	5	33	18.5
Oral Health	3	5	10	18	10.1
Maternal and Child Care	4	5	11	20	11.2
AIDS Control	10	24	22	56	31.5
TB and Leprosy	4	8	4	16	8.9
Malaria control	-	-	-	-	-
Eye Diseases	4	5	3	12	6.7
Laboratory Diagnosis	3	4	4	11	6.1
Anaemia	4	3	5	12	6.7
Vitamin A Deficiencies	5	5	5	15	8.4
Diarrhoeal Diseases	6	8	6	20	11.2
Information System	10	24	22	56	31.5

### Health Education

Table 7 summarises the distribution of responses (percent) given to three knowledge questions on malaria asked to all respondents in the study. The overall level of awareness (estimated on the basis of correct explanation regarding malaria causation, transmission and treatment (N=1250)) was high, 87.5% mentioned mosquitoes bite as cause of infection, 81.2% mentioned chloroquine or Sulfadoxine/Pyrimethamine (Fansidar) as potential drugs that can be used for treating malaria.

Fewer respondents (33%) knew the appropriate doses for children under five years. On malaria prevention 71% mentioned anti-mosquito measures and chemoprophylaxis as means to prevent malaria. The most common source of information on treatment (83.3%) was DHS facilities. Other sources of information mentioned included relatives and friends, schools and mass media. The results suggests that DHS plays a useful role in providing information regarding causes and treatment of malaria.



**Table 7: Information and Health education on Malaria (N=1250)**

Knowledge on Malaria	Correct responses among all respondents	Source of information (%)			
		DHS	Relatives	School	Other including Mass-Media
Causation	(1093) 87.5%	51%	32%	10%	7%
Treatment	(1015) 81.2%	83.3%	8%	6%	2.7%
Prevention	(887) 71%	46%	21%	31%	2%

( ) absolute number of respondents

### Diagnostic Facilities

Of the 35 health facilities visited 10 had microscopes which could be used for malaria diagnosis. However only in 5 units which were using them. In most other areas the instruments were not used due to lack of reagent supplies and trained staff.

### Malaria case fatality rates in the districts' main hospital

Table 8 shows the overall number of deaths at the district hospital between 1989-1996. The data on trend of deaths due to malaria during the same period is also shown. The results indicate an increase in case fatality rates from 36 deaths per 1000 people in 1989 to 67.8 per 1000 people in 1996.

**Table 8: District Hospital Admissions Death Rates and Malaria Case Fatality Rates Between 1989-1996**

	1989	1990	1991	1992	1993	1994	1995	1996
General Admissions	14025	15581	10218	11117	12829	12328	13966	13148
Deaths	587	647	638	489	747	587	802	870
Death rates per 1000	41.8	41.5	62.4	44.0	58.2	47.6	57.4	66.2
Malaria Admissions	3803	3445	3213	4855	NA*	3681	4108	4899
Deaths	137	145	103	150	132	275	255	332
Malaria fatality rates per 1000	36	42	32	31	NA*	74.7	62.1	67.8

\* NA - No records were available

### Discussion

The national target for Malaria control in Tanzania from 1982 has been to foster national and international collaboration activities with three aims: (i) to develop programmes to prevent and control malaria by 1986; (ii) to have a countrywide programme for malaria control that will reduce the annual morbidity to less than 1% (iii) To introduce measures to prevent the re-establishment of malaria in all malaria free areas by 1989. These aims reflect broader international efforts coordinated by World health Organization. (*Seven General Programme of Work 1984-1989, World Health Organization, Geneva 1982*). The present study assessed the performance of DHS in relation to malaria at the district level to determine the degree to which these national and international targets were translated

into programme and activities. The study also aimed at assessing how robust are district health services in coping with local health problems.

The national malaria control program (33) require that operational responsibilities for control of malaria be carried out by the general health services at the district level under the guidance of Ministry of Health. This involves the development of approaches and techniques for each district, and possibly each community within the district, based on the stratification of malaria epidemiology within each district. It should be mentioned here that in the past (before 1980) malaria control was one of several vertical programmes organised by the Ministry of Health. It was the advent of primary health care approach to health service provision as

results of Alma Ata declaration in 1978; and the operational problems of coordinating the previous vertical malaria control activities which led to integration of malaria control functions to the DHS activities. In essence DHS were to develop their own malaria control strategy and activities as part of district health planning. There were nevertheless no clear guidelines from the Ministry of Health on the procedure to be followed and the outputs expected. A notable feature was that the integration was considered as an end by itself, that is, integration is an objective, and not as means to achieve objectives for malaria control (34). While the objectives for malaria control within the DHS are explicit, for instance, to reduce deaths among the children below five years of age by half by 1995, the lack of reciprocal explicit implementation strategy which was revealed in this study suggests that the assumption is made that the district's malaria control objectives can be achieved as an outcome of integration process itself.

These findings show that malaria presents one of the biggest challenges to DHS effectiveness in the Muheza district. The data shows a growing trend of resistance for most anti-malarials used within the DHS, a growing case fatality rates at the district hospital, and increasing malaria incidence in the general population. The DHS utilization data shows that 67% among the children below five years of age (the most vulnerable group for malaria) are currently not reached by the DHS. The potential alternative sources of care for those not reached by DHS include traditional medicines, self treatment, and private dispensaries. However, the coverage of private dispensaries (<10 in total) is mostly confined to the two small towns in the district (Muheza town and Maramba). These findings and in particular the advent of multi-drug resistance in malaria raises serious concerns regarding the DHS effectiveness.

Lack of training provided of health care providers for malaria control raises a number of issues in relation to priority setting for training at the district level. Relatively large part of the training provided centre around vaccination, family planning, AIDS control and information system. These are the areas that receive the largest donor support within the district. Malaria, although responsible for more than 80% of deaths among the children below five years of age in some villages within the district is not given priority. Limited needs assessment by those involved in the provision of training at the district level is revealed.

Other findings which merit further investigations include for example the fact that the DHS in the Muheza district spends only 1% of its recurrent expenditure on activities such as provision of health education. In spite of this minimum expenditure, the DHS is still the community's main source of education for malaria. The results shows

that 51% of respondents regard the DHS as their primary information source regarding malaria causation, 83% for treatment and 46 % for prevention. A number of possibilities could explain this contradiction. Continuity of care which imply that since most of those interviewed were adults there has been time in the past when DHS functioned optimally and had a lasting impact in terms of knowledge regarding malaria may be one explanation. The second possibility could be related to community's misclassification of professional activities within the DHS. This implies that patients perceive any encounter with DHS staff as a learning exercise. In this case the DHS users gain their knowledge during routine consultations with DHS providers. Thirdly the impact of limited resources which goes to health education and yet generate impressive results, imply that health education is more cost effective compared to other activities within the DHS in the Muheza district.

The lack of a local malaria control strategy in Muheza district suggests a weak link between the national and international levels and the districts. In the context of the decentralization of health services in Tanzania to the district levels this implies a weak capacity on the part of district management to develop local and micro-policies that reflect the local needs and resources. This is another area which needs to be addressed if the districts are to remain robust entities in dealing with local health problems including malaria in Tanzania.

One possible lesson from integration of malaria control at the district level could be that such integration refers to structural re-organization which do not necessarily produce alterations in the ways the DHS function. The case of malaria control therefore, is a classical example where a distinction needs to be made between structural and functional integration. The integration of various activities within a single organization such as DHS does not always lead to functional integration i.e integration of various tasks to be done at the level of household or community. Better strategic planning and monitoring the implementation is required and the district may not have the necessary capacities. Assessment of these capacities and their development may be crucial to functional effectiveness of DHS.

#### References

- 1, 11, 12, 32. Salum, F.M., Wilkes, T.J., Kivumbi, K. & Curtis, C.F (1994). Births and Deaths in an Area Holoendemic for Malaria. 11th Annual Joint Scientific Conference February 1993, Arusha Tanzania
- 2, 16, 21. Lyimo, E., Msuya F., Rwegoshora, R., Nicholson, E., Mnzava, A., Lines, J. & Curtis, C. (1991). Trial of Pyrethroid Impregnated Bednets in An Area of Tanzania Holoendemic for Malaria Part 3. Effects on the Prevalence of Malaria Parasitaemia and Fever. *Acta Tropica* 49: 157-163.
- 3, 15, 22. Lemnge, M, M (1995) "Malaria and Filariasis at Magoda Village in Northern-eastern Tanzania: Epidemiology, Maloprim Malaria Prophylaxis and Estimation of Blood Maloprim Levels" *PHD Thesis University of Copenhagen.*

- Epidemiology, Maloprim Malaria Prophylaxis and Estimation of Blood Maloprim Levels" *PHD Thesis* University of Copenhagen.
4. Kitua et al (1996) *Plasmodium falciparum* Parasitaemia malaria in the first year of life in an area of intense and perennial transmission. *Tropical Medicine and International Health* **1**, 475-484.
  - Rønn, A, Msangeni H, Mhina, J, Wernsdorfer W, Bygbjerg I (1996) High Level of resistance of *Plasmodium falciparum* to sulfadoxine pyrimethamine in Children in Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **90** : 179-181
  - 6, 7, 8, 31. WHO, (1986) "World Health Organization Expert committee on malaria." 18th report *Technical Report Series No 735* WHO, Geneva.
  - 9, 23, 33. Ministry of Health Tanzania (1996) Tanzania Health Policy Strategy Note, Dar es Salaam
  10. Mwaluko, C., Kilama W., Mandara, M., Murru, M., Macpherson C. (ed)(1994 )*Health & Disease in Tanzania*. HarperCollins Academic, London
  13. Ministry of Health Tanzania (1997) Health Sector Reform Programme, Dar es Salaam
  14. Vaughan P. Morrow R (1991) *Manual of Epidemiology for District Health Management* WHO, Geneva.
  17. El-Bindari-Hamad A. and Smith D. (1992) *Primary Health Care reviews. Guidelines and Methods*. WHO, Geneva.
  18. Kilama W. Kihamia, M. (1991) Malaria. In Mwaluko, G. Kilama, W. Mandara P., Murru, M and Macpherson C. (ed) (1991) *Health and Disease in Tanzania*. Harper Collins Academic, Cambridge.
  19. Clyde, DF. (1967) *Malaria in Tanzania*. London: Oxford University Press.
  - 20, 26. Lelijveld, J and Mzoo F (1970) The effect of Small doses of chloroquine on *Plasmodium falciparum* in north-eastern Tanzania. *Bulletin of World Health Organization*. **42**: 471-477.
  24. Clide, DF (1961) Chloroquine treatment of semi-immune patients. *American Journal of Tropical Medicine and Hygiene* **81**, 151-6.
  25. Pringle G and Lane F.C (1966) An apparent decline in efficacy of small doses of Chloroquine in suppressing malaria parasitaemia in semi-immune African school children. *East African Medical Journal*, **43**, 575-8.
  27. Goosen, Th. J.1975. Studies on the sensitivity of *Plasmodium falciparum* to antimalarial drugs: Studies at Kicheba and Tororo. Annual Report of the East African Institute of Malaria and Vector-borne Diseases. January 1974-December 1975, 914.
  28. Kilimali, V.A.E.B., and A.R. Mkufya 1985a. In vivo and In vitro assessment of the sensitivity of *Plasmodium falciparum* to chloroquine in four districts of region, Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **79**, 478-81.
  29. Mutabingwa, T., Hills, H., and Kilama, W (1985). Response of *Plasmodium falciparum* to chloroquine in hospital patients at Muheza, Tanzania. *East African Medical Journal*. **62**: 161-71.
  30. Rønn, A. (1997) Drug Resistance in Malaria: Paper Presented In Danish Society for Tropical Medicine, Copenhagen.
  34. Mills, A. (1983) Vertical Versus Horizontal Health Programmes in Africa: Idealism, Pragmatism, Resources and Efficiency *Social. Science and Medicine* **17** (24): 1971-1981