INSECTICIDE TREATED NETS PROGRAMME: EXPERIENCES FROM AN ON-GOING PROGRAMME WITHIN THE CONTEXT OF HEALTH SECTOR REFORMS IN MOROGORO RURAL DISTRICT

By

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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by the University of Dar es Salaam dissertation entitled "INSECTICIDE TREATED NETS PROGRAMME: EXPERIENCES FROM AN ON-GOING PROGRAMME WITHIN THE CONTEXT OF HEALTH SECTOR REFORMS IN MOROGORO RURAL DISTRICT" in partial fulfillment of the requirements for the degree of Master of Public Health (MPH).

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I Dr. Sadiki Muze Mshana, declare that this dissertation is my own work and that has not been presented and will not be presented to any other University for a similar or any other degree award.

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This work is dedicated to

My father and my dear late mother.

My beloved wife and,

My loving children Muze, Sifaeli & Tumwagile.

Abstract

ITNs programme for malaria control is a new intervention in the health sector. It is a programme that needs a lot of consideration in terms of resources and managerial capacity. Human resources, required materials, adequate financial support and planning are necessary for a successful programme.

DHMTs are still in a transitional phase with no experience in implementation of such a programme. Hence, they are likely to face initial hurdles and challenges.

This was a cross-sectional study and descriptive in nature employing quantitative and qualitative methods. In total, 210 mothers in each randomly selected households and 19 programme implementers were interviewed. From these 210 mothers and 19 implementers, information was obtained that was complemented with in-depth group and individual interviews.

Of the six implementers interviewed at district level, all said that the ITNs and insecticide supply was irregular. These implementers' view was supported by two out of five of village health workers.

All 19 all implementers interviewed at all levels reported that IEC messages about ITNs and their treatment were conveyed to the community and different message channels were used such as billboards, posters, stickers, and T-shirts. Others were health education, meetings and house to house visits.

All the 19 implementers interviewed kept records and 84% of them reported that they were supervised in the last 3 months.

Among the 3 villages, the lowest proportion of ITNs use (58.6%) and re-treatment rate (18.6%) in the last 3 months was found in Fulwe village which is 5 km from a health facility. The facility is the main source of the items. The pattern was different in the other villages whose source of items was within their vicinity.

Among the mothers who were the users of ITNs, the age group of 16-35 years had the lowest re-treatment rate. About 63% of these mothers, their nets were not treated in the last 3 months. This also applied to the unmarried mothers who had the lowest use of ITNs and re-treatment rate. About 71% of their nets were not treated in the last 3 months. Among the users of ITNs, the mothers with above primary education level had the highest use of ITNs and re-treatment rate. About 100% re-treatment rate was found in mothers with college education while the lowest re-treatment rate (33.3%) was found in mothers with no formal education as well as with incomplete primary education.

The majority of the interviewed participants in both groups and individual interviews were aware that mosquitoes and poor environmental sanitation was the cause of malaria and that many people nowadays do use ITNs than in the past before the start of the programme. Those interviewed were of the opinion that the implementers were performing their work well. They also expressed the views that the few who are not using ITNs were doing so because of inadequate cash in the families.

The majority of the groups and individuals interviewed suggested that more mobilisation of the people is needed to sustain the ITNs and their treatment in the community.

To a large extent the programme in its initial phase has performed well in creating an enabling environment for the use of ITNs. The programme is on- going and the potential for achieving the laid down objectives is high.

There are some areas that require more efforts for improvement by the implementers, such as the constant availability of ITNs and insecticide at all levels and this can be achieved through review of the delivery system of the programme. There is a need of more awareness creation to people for the use of ITNs and their treatment. There is a need to have research for differential prices. The people should be mobilised for improvement of their poor environmental sanitation around their living areas and also to conduct advocacy to institutional leaders for improvement of the working places.

The efforts for mobilisation of people to seek medical care early should be continued and appropriate medical care for malaria patients in health facility should be maintained.

There is a need to adopt Sector Wide Approach in the programme and multi-sectoral collaboration for long term use of ITNs and sustainability.

Table of Contents

Certification.	ii
Declaration and Copyright	iii
Acknowledgement	iv
Dedication	v
Abstract	vi
Table of Contents	x
List of Tables	xi
List of Appendices	xii
Definitions and Abbreviations	xiii
Introduction	1
Problem statement	13
Objectives	15
Literature review	15
Methodology	23
Design of the study	27
Results	36
Discussion	47
Conclusion and Recommendations	52
References	54
Appendices- questionnaires & maps	59

List of Tables

Table 1 Perception of staff members implementing the ITNs programme on performance indicators at different health care levels

Table 2 Proportion of use of nets in the 3 villages

Table 3 Source of information about ITNs as reported by interviewed Mothers.

Table 4 Source of nets in the community

Table 5 Proportion of household members who slept under the nets the night before.

Table 6 ITNs use according to age of mothers

Table 7 ITNS use according to marital status of mothers

Table 8 Proportions of use of ITNs, treated ITNs and untreated nets.

Appendices

1. Questionnaires

   1a & b- English and Kiswahili versions of Interview with implementers

   2a & b- English and Kiswahili versions of Interviews with mothers.

   3a & b- English and Kiwahili versions of In-depth group interviews.

   4a & b- English and Kiswahili versions of In-depth individual interviews.

2. Morogoro rural district maps

   Mapping malaria risk in Morogoro rural district

   Health facilities

Definitions and Abbreviations

Mothers	Women who take care of children
Insecticide Treated Nets (ITNs)	Pre-treated nets
Treated nets	Nets that are treated within 3 months
Untreated nets	nets that are not treated at all or treated beyond 3 months

Acronyms and Abbreviations

AID	Agency for International Development
AMMP	Adult Morbidity and Mortality Project
ARI	Acute Respiratory Infection
CBR	Crude Birth Rate
CDC	Centre for Diarrhoea Control
CDR	Crude Death Rate
CHNs	Community Health Nurses
DHSP	District Health Support Programme
CORPS	Community Owned Resource Persons
DALYS	Disability Adjusted Life Years
DHMT	District Health Management Team
DHO	District Health Officer
DHP	District Health Plan

DMO	District Medical Officer
DNO	District Nursing Officer
DSS	Demographic Surveillance System
DVBD	Division of Vector Borne Diseases
FLHF	Front Line Health Facility
GDS	Genital Discharge Syndrome
GFR	Gross Fertility Rate
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
GUD	Genital Ulcer Disease
HC	Health Centre
HE	Health Education
HMIS	Health Management Information System
HSRS	Health Sector Reforms
HWs	Health Workers
IMR	Infant Mortality Rate
IDRC	International Development and Research Centre
ITNP	Insecticide Treated Nets Project
ITNs	Insecticide Treated Nets
LDC's	Less Developed Countries
MMR	Maternal Mortality Rate
NGO	Non-Government Organisation

NHP	National Health Plan
NMCP	National Malaria Control Programme
PEM	Protein Energy Malnutrition
PHC	Primary Health Care
PHNO	Public Health Nursing Officer
PID	Pelvic Inflammatory Disease
PSI	Population Services International
RBM	Roll Back Malaria
TEHIP	Tanzania Essential Health Intervention Project
TFR	Total Fertility Rate
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
WWF	World Wild Life

INTRODUCTION

Malaria is one of mankind's most feared and serious affliction that causes more morbidity and mortality than any other human disease. Lankinen [1994] noted that 55% of the world's population is exposed to the infection that exerts its effect mainly on young children and pregnant women (Lankinen *et al,* 1994). In The WHO report of 1994, it was estimated that 40% of the world's population (about 2 billion people) in 100 countries are exposed by the disease. In these countries about 300 to 500 million people suffer from malaria fevers per year. Deaths attributed by the disease range from 1.5 to 2.7 million per year [WHO 1994]. Musil [1999] noted that there is a death occurring due to malaria every 15 seconds (Musil *et al,* 1999). Children under five years of age are the most affected. Each year a million children under five die of malaria. In The WHO report of 1994, it was noted that Sub-Sahara Africa is the most and seriously affected region. For it is estimated that the region accounts for 80% of the total world cases and 90% of the deaths. The disease does not only affect children but also includes women in their first or second pregnancy, non-immune adults and travellers. Further more, in 1993, World Bank estimated that Malaria contributes about 35 million DALYS that are lost in Sub-Sahara Africa due to premature deaths and disability [World Bank 1993].

Malaria in human is caused by infection either with *Plasmodium falciparum, Plasmodium malariae, Plasmodium vivax, or Plasmodium ovale. Plasmodium falciparum* is the predominant parasité in Sub-Sahara Africa. The parasite is the most virulent and deadliest among the four. The parasite multiplies most rapidly in red blood cells causing severe anaemia, brain damage resulting in coma and other organ failure.

Death may result if diagnosis and prompt treatment is delayed. The other malaria parasites rarely cause death (Lankinen *et al,* 1994). Malaria parasites are transmitted through anopheline mosquitoes. There are 400 species of *Anopheles* world-widely.

Tanzania is a country described as a sea of intense malaria transmission in which, there are Islands that are also affected by little transmission. The Islands are areas and towns of high lands, at the altitude of higher than two thousand meters above sea level. However, Clyde [1967] and Fivawo [1985] emphasised that the Islands are subjected to invasion. Some years later, Kilama and Kihamia in 1991 observed that, the disease was spreading to areas where malaria was free and to quote them "malaria is more spread today than perhaps ever" (Mwaluko *et al,* 1991).

The effects of malaria to a nation like Tanzania are serious. Malaria contributes to a great proportion of both morbidity and mortality. The disease is a major chronic impediment to health of affected communities. It may, therefore, account to much absenteeism from school and from work. This was well expressed by Fivawo in1985 when she said that malaria lowers the labour output and affects the Tanzanian economy (Fivawo1985). In an area where malaria transmission is stable and young women have a degree of acquired immunity, malaria remains a major cause of maternal deaths, abortion, stillbirth, premature delivery and low birth weights. Gilles [1993] emphasising the point he noted that in non-immune people, cerebral and others forms of *falciparum* malaria are common in pregnancy and the mortality is higher than in other patients (Gilles *et al,* 1993). Further more, Fivawo [1985] noted that malaria prevalence in

endemic areas in primigravida has been reported in Kenya as high as 85.7% and 51.7% in multiparous women (Fivawo 1985).

In the report of MOH [1998] for the years 1996 and 1997, it was noted that, health data from all health facilities in Tanzania showed that, malaria was a leading disease in outpatient department. On an average, malaria is responsible for 35% of outpatient attendance. The malaria specific mortality in inpatients was 25% during the same period.

In the report it was further noted that in the three areas where community demographic surveys are conducted since 1992, the collected data support the already explained malaria situation in the country. The statistics for the period 1992-5 from the surveyed areas of Morogoro rural, Hai districts and Dar es Salaam region show that febrile illness and malaria are leading causes of deaths in all ages and both sexes particularly in Morogoro rural district. AIDS and pulmonary tuberculosis in males and the same diseases with addition of maternal deaths in females overtook febrile illness and malaria in age group of 15 to 59 years in Dar es Salaam and Hai district.

In Tanzania malaria disease is transmitted by *Anopheles gambiae complex* and *Annopheles funestus*. *Anopheles gambiae complex* is the most efficient and widespread malaria vector in the country. The vector breeds in collection of fresh and brackish water of any size provided the water is not shaded. The mosquito is therefore present throughout the year in the country. *Anopheles funestus* favors more shaded and permanent breeding sites like on swamps, lakes and slow moving rivers.

Back in 1967, it was noted that the four main malaria parasites are present in the country with the predominance of *Plasmodium falciparum* that makes 90% of malaria causing parasite. *Plasmodium malariae* makes 7% and *Plasmodium vivax* together with *Plasmodium ovale* make less than 5% (Clyde, 1967).

The need to fight against malaria is more urgent today than ever before in the past because:

- There is an increase in morbidity and mortality due to the disease.
- The areas that were free of malaria are becoming malarious.
- Epidemics are more frequent.
- There is increasing drugs resistance to first line drugs such as chloroquine.

One of the advocated means of dealing with malaria is to use an integrated public health approach. In the beginning of the 1990's The World Health Organization advocated four basic elements for global strategy to deal with malaria:

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

Early diagnosis and treatment, especially in children, is a priority. The spread of malaria and of drugs resistance means that prevention, in particular new approaches to vector

control, is becoming increasingly important. Globally, chemoprophylaxis for prevention of malaria is used to prevent malaria attacks to risk population groups such as non-immune people travelling from none malaria areas to endemic areas. Chloroquine is still in use in countries with no chloroquine resistance. In areas with low resistance Lankinen [1994] noted that the combination of chloroquine with proguanil is used. In areas with high chloroquine resistance chloroquine is no longer in use and sulphadoxine pymethamine as alternative drug to chloroquine is recommended for treatment though not for chemoprophylaxis. Other drugs like mefloquine and doxycycline are not fit to be used by pregnant and children because of adverse effects. Since many of the poorest nations of the world are afflicted with malaria, a successful drug intervention must be inexpensive (affordable), cost effective and relatively easy to administer and maintain (Lankinen *et al,* 1994).

Vaccines are among the cost effective and easily administered means of controlling infectious diseases. Reporting on the SPF 66 vaccine, Musil [1999] noted that at first trial in Tanzania, the vaccine gave hope of future efficacious vaccine but did not prove so in other trials in the Gambia (Musil *et al,* 1999).

The focus of current malaria vaccine research is on DNA technology. The future multi-component DNA vaccine offers the best prospects for protection against malaria.

Another possible development in malaria prevention is the future plan to sequence a genome of *Anopheles gambiae* and this is expected to incapacitate the mosquito to malaria parasite transmission. However, Musil [1999] is on the opinion that this is unlikely to occur in the near future (Musil *et al*, 1999).

Other measures are to use public health measures such as spraying and drainage. The use of DDT, which is, now phasing out contributed a lot to success of many programmes in which it was used as insecticide in malaria control. The synthetic insecticides such as pyrethroids are more likely to replace DDT in future. Drainage and other sanitary methods while simple in the concept of destroying mosquito breeding sites are not practised in many poor countries due to high initial investment cost. In countries such as Mexico and The Philippines biological control is used to reduce mosquito densities by using fish, which feed on mosquito larvae. The biological control is not yet used in Sub-Sahara Africa.

The use of mosquito barriers, which prevent mosquitoes from reaching humans, Matteson [1999] noted that it is an important aspect of malaria control. It has always been recommended that, screens for houses, better house constructed doors, curtains, bed nets and other measures to restrict mosquito entry to houses also help to reduce mosquito biting (Matteson *et al,* 1999).

Emphasising the use of Insecticide Treated Mosquito Nets (ITNs) Chavasse [1999] noted that it is now advocated by international agency like WHO, using a new movement "Roll Back Malaria" (RBM) which recognises ITN as a promising tool in efforts to deal with malaria. The RBM movement has increasing interest in integrating treated nets into malaria control policies and programs (Chavasse *et al,* 1999). Reporting on the use of ITNs, the [MOH 1997] insisted that the use of insecticide treated nets is seen as an effective measure in the reduction of malaria transmission.

As a matter of fact, people have been sleeping under nets to protect against mosquito and other insect bites for many years in history. But, the use of treated nets using DDT was first introduced in the World War of 1939-45.

Widespread treatment of nets was only practical after introduction of synthetic pyrethroids in 1970s. Reporting the effect of the insecticides Chavasse noted that these insecticides were proved safe to people at the same time were also effective in the killing and repelling insects.

From different large studies in The Gambia, Ghana and Kenya Lengeler *et al,* [1996] documented a 17-63% reduction in overall child mortality as a result of ITNs used. Morbidity reduction was 30-40% in Kenya; 55% in Tanzania (Bagamoyo Study) and up to 63% in the Gambia.

Despite of these very significant ITN trial impact clinical results (which were produced in highly controlled studies), Matteson *et al,* [1999] expressed the feeling that the ITNs programmes had proved both complex and costly. Concerning the cost, Christian Lengeler *et al,* [1996] reported that it is recommended that the governments in countries where malaria is endemic should consider ITNs as public health commodities, which need the removal of taxes and other tariffs.

Globally, it is recognised that there are few examples of successful and sustainable large- scale operational programmes. The Chinese ITNs programme in Sichuan, which covers a population of 3.85 million, is only a good example in the world. The programme only deals with spraying of nets using Deltamethrin. The Government and the people in the community finance the programme.

It is advocated that the key players who are to promote wider access to, and use of, treated nets will be the private sector, the public sector, the donor community and the NGOs. The private sector needs efficient and extensive distribution of a product to maximise sales and the public sector needs the same to maximise coverage of the population. Malaria is predominantly a disease of the rural poor and this population is therefore the main target for the public sector, but the private can make greater profits by targeting the urban rich.

In the developed countries, it is possible to have public-private partnership in which the public-sector contracts out specific tasks to the sector. In the developing countries the public sector has neither the funds nor the capacity to establish partnership directly with private sector, and intermediaries are required, such as a donors to provide cash, and specialist NGOs to provide capacity.

The Private Sector

It is increasingly recognised that the role of the private sector must be expanded to make the best use of commercial approaches to demand creating; through advertising and promotion. And to supply through effective and sustained private sector distribution channels. The private sector can efficiently supply middle and upper income groups that can afford to buy nets at a price that yields sufficient profit and incentive.

In Africa there are two examples of the private sector providing good net coverage. On reporting the good coverage in African countries, Chavasse *et al,* [1999] noted that The Gambia has one of highest net coverage rates in the world. In Tanzania, the local

manufacturers have met the dramatic increase in demand for nets over the past five years.

The Public Sector

Public sector delivery of ITNs has been reasonably successful in richer countries with well-funded health ministries. In some Asia and South pacific countries for example, subsidised nets and insecticide have been made widely available. However, unlike the private sector, there may be incentive for the public sector to improve or sustain efficient delivery. Well, in terms of cost per net delivered or retreated it is debatable whether it should be the role of the public sector to organise vertical distribution for all sector of the community particularly where health services are already over burdened.

The NGO Sector

The NGO sector can act as in intermediaries between the donor community and the public and the private sector. Depending on their policies and their nature, NGO can play a range of roles in ITN initiative. For example, they can provide procurement services in particular countries, deliver nets and insecticides to particular population groups or in specific geographic areas create demand through advertising and promotion, and supply a public or private sector distribution chain. Another good example is the way social marketing NGO can stimulate efficient distribution of nets and insecticides through whole sellers and retailers thereby reaching the middle and high income groups. In poorer rural areas with few retail outlets the same NGO can organise delivery through rural clinical and community based distributors. Whilst this may be a

less efficient distribution structure it ensures that those at greatest malaria risk also have good access of insecticide treated nets.

The Donor Community

Public funds are used throughout the developed world to provide health care for the poorest of the community and there is no reason why the same should not apply in developing countries and for interventions such as insecticide treated nets. Although programme sustainability often narrowly defined as continuing implementation after donor support is withdrawn, experience suggests that a sustained impact on malaria using insecticide treated nets requires some on-going donor support.

Tanzania is among countries that are implementing Health Sector Reforms (HSRs). In 1994 MOH (in its HSRs Proposal) emphasised that there was the need to either reinforce or review areas of the health sector in the country for the aim of improving health and health care delivery system. In this document it was realised that there exists a need for external assistance, but the assistance should be directed towards activities that will enable the health delivery system to be self-reliant and sustainable. The document explains very well the need of empowering district, community and household initiatives through the development and implementation of proper District Health Plans (DHPs). On further clarification, the MOH [1990] in the National Health Policy (NHP) document emphasised that District Health Management Team (DHMT) has a mandate to district heath planning. The District Medical Officer (DMO) who is the Primary Health Care (PHC) manager and the chairman of DHMT should be responsible for co-ordination of implementation of health activities in the district. In-fact, the government of Tanzania is

more committed to provide more support to community based health care activities that will reinforce implementation of PHC. The MOH [1994] in the 1994 Health Sector Reforms Proposal explained clearly that the government still regards the PHC as a basis of the NHP.

In Morogoro rural district, the DHMT in their 1997/98 annual health plan, decided to implement an ITNs strategy for malaria control. This is one of the first large-scale ITNs programmes in Tanzania in the context of Health Sector Reforms (HSRs) and use of social marketing in the supply of nets and insecticides. It is very likely that other districts will decide similarly. Therefore it is important to document the Morogoro rural experiences, of how to start and implement a district wide ITN strategy. The lesson learnt can be useful in other districts in Tanzania. This research aimed to document the process as well as implementation methods used in Morogoro rural.

INTs programme background in Morogoro rural district

The ITNs programme in Morogoro rural district featured in the DHP of 1997/98. The ITNs strategy was included in the district health plan for the following reasons:

1. New appreciation by DHMT of community burden of malaria mortality from Demographic Surveillance System in Morogoro rural district.
2. Adequate ITN information to the DHMT.
3. Availability of resources for the start of the programme.

The program took 6 months of preparation before it took-off. There were issues to be considered such as possibility of ITNs to leak to Morogoro urban district as Morogoro rural district surrounds Morogoro urban district.

In the establishment of ITNs programme in Morogoro rural district the following were considered:

1. Identification of malaria as a public health problem through health facility and Demographic Surveillance System (DSS) data.
2. The DHMT was adequately informed about ITNs and insecticides and their use through a specially organised seminar.
3. The featuring of ITNs program in the DHP of 1997/98.
4. The ITN program matches with the National Malaria Control and Prevention Policy.
5. The Ministry of Health and the local government support the program.
6. The distribution of ITNs by community based approach and the DHMT to be fully involved in the procurement of the ITNs and the insecticides and their distribution to the community by phases.
7. The programme has an objective of reducing morbidity and mortality by 25% in phase I selected villages.
8. The specific objectives are:

   (a) To promote the use of ITNs

   (b) To encourage the pregnant women and mothers to attend MCH services by subsidising the price of ITNs and insecticide that are to be sold at MCH clinics.

   (c) To conduct an assessment on what people think about ITNs to health workers, community, animators and community selected selling agents.

9. The district has a donor support from Tanzania Essential Health Intervention Project (TEHIP), which is supported by International Development and Research Centre (IDRC) – Canada. The project supports the DHMT financially. One of the programmes that are recommended in the support is of ITNs. With the financial support the DHMT purchases nets and insecticides and sell them at subsidised prices, ie a net of 130 × 180 × 150 cm in the market sells about Tshs 4000.00 but at subsidised price it sells at Tshs 2500.00. Insecticides like in the form of sachets at market price a sachet sells at Tshs 600.00 but at subsidised price sells about Tshs 400.00. The money obtained in the sales is the revolved for the purchase of new products.

10. The Population Services International (PSI) supplies the nets and insecticides through social marketing. DHMT buys the commodities at price some-what lower than the normal market prices.

From this background of the project the investigator conducted an evaluation study on this on-going ITN programme implementation so that the programme experience can be extrapolated.

Problem Statement

ITNs programme is a new intervention in the health sector. It is a programme that needs a lot to be considered in terms of resources and managerial capacity. Resources should include manpower, materials and financial support.

Various people are to be engaged in the programme while are already engaged in the PHC delivery system. There is possibility of over working the first line health workers

who are already busy with other programmes. The purchase of ITNs and insecticides, the temporary storage of the commodities and their distribution are challenges to be faced in order to have successful implementation of the programme. Considering all these, one may get an impression that implementation of ITNs programme within HSRs context might not be a successful venture.

Lengeler [1996] expressed the notion that ITNs programmes are usually costly and complex. Stressing the point that most of the ITNs trials that produced good clinical results were implemented in under strict control and with substantial financial, human and technical resources. Generally speaking, the conditions hardly resemble those in which control programmes must be delivered and sustained in PHC delivery systems (Lengeler *et al,* 1996). Muhondwa [1986] explained that experiences in many of the Less Developed Countries (LDC) showed that success of even small scale local project implementation had been difficult to attain because the success depended very much on factors like local conditions and leadership.

The rationale of the study

Most of the DHMTs in Tanzania are faced with the problem of deciding on which intervention/programme to be undertaken in order to reduce prevalence of malaria morbidity and mortality particularly in the vulnerable groups. ITNs programme gives a good hope for the DHMTs. But it is a fact that most DHMTs have no experience in the implementation of such a programme. They need to learn from experiences of DHMTs in Tanzania where such programmes are implemented.

The investigator, therefore, tried to identify critical steps in implementation of the ITNs programmes in Morogoro rural district.

Purpose of the study

To evaluate the large-scale Morogoro rural district ITNs programme which is within the context of HSRs, so that the lesson learnt can be used in other districts which are in the process of implementation of such programmes or intend to do so.

The Objectives

Broad objective

Evaluation process of implementation of the ITNs programme in Morogoro rural district.

Specific objectives

1. To find out how much various people have fulfilled their roles in the programme.
2. To determine coverage of ITNs in the community.
3. To determine the re-treatment rate of ITNs in the community.
4. To determine the patterns of use of ITNs in the community.
5. To determine perceptions regarding ITNs acceptance and sustainability of the programme.

Literature Review

Historically, people have been sleeping under nets to protect themselves against mosquitoes and other insects for centuries. For the first time nets treated using DDT were used during World War II (Lengeler *et al*, 1996).

Widespread treatment of nets was only practical after introduction of synthetic pyrethroids in 1970s. These insecticides were proved safe to people at the same time are also effective in the killing and repelling insects (Chavasse *et al,* 1999).

The use of ITNs is now advocated by international agencies like World Health Organisation, using a new movement "Roll Back Malaria" (RBM) which recognises ITN as a promising tool in efforts to deal with malaria (Desmond Chavasse *et al,* 1999).

The use of ITNs is seen as an effective measure in the reduction of malaria transmission (MOH 1997 and Lengeler *et al,* 1996).

Large studies in The Gambia, in Ghana and Kenya documented a 17-63% reduction in overall child mortality as a result in ITNs used. Morbidity reduction was 30-40% in Kenya, 55% in Tanzania (Bagamoyo Study) and up to 63% in the Gambia (Lengeler *et al,* 1996). The studies are usually conducted in highly controlled condition. What is known is that translating approaches that are successful in research trials into practice is not easy and that successful implementation requires a sound understanding of technical, social and operational issues (Chavasse *et al,* 1999).

It is recognised that there are a few examples of successful and sustainable, large-scale operational projects of ITNs (Chavasse *et al,* 1999).

The government ITNs project in Sichuan China, which covers a population of 3.85 millions is a good example of successful, sustainable large- scale project in the world. The project deals with spraying existing nets using Deltamethrin at a dosage of 9-15mg/sq. Government and people in the community meet the cost of running the project.

The coverage has been maintained at 96.7% per year (Chavasse et al, 1999). The success could be due to the fact that people in Sichuan are used to mosquito nets.

Although information about lessons learned from areas where such large scale programs are implemented are not widely available, the projects which are implemented in countries such as New Papua Guinea, the Philippines, Kenya, the Gambia and Tanzania are worth mentioning.

The New Papua Guinea has been conducting a series of pilot schemes for seven years before embarking on a national ITNs project.

The department of health with the donor support implemented this project for three years. The purchase and distribution of the nets was co-ordinated by National Malaria Control Project (NMCP) and implemented through PHC system. At national level, guidelines for distribution and treatment of nets were produced and distributed to provisional health workers. The guidelines stipulated that the provinces should prepare action plans for systematic coverage of population in the districts and establish revolving funds from the initial sale of nets provided by Health Department. The provincial health workers were to sell the nets at government set prices.

The project worked well during the three years. But the project then experienced the following problems:

- Decentralisation of health services meant the NMCP had little authority to enforce government guidelines on the provinces
- Detailed plans of operation were not developed by provinces as recommended

- Nets were sold unsystematically to anybody who wanted them or not, resulting in low coverage over a wide area and difficulties in following up with treatment
- Nets were generally sold at a higher price than recommended by the government but the revenue was seldom remitted to the central level

This experience suggests that implementation through a vertical programme will only work if there is a strong infrastructure in terms of administration and resources (Chavasse *et al*, 1999).

In the Philippines, the NMCP funds and runs an ITNs project. The project has staff in all levels from central, regional, provincial to community level. For implementation the project has prioritised the area and villages of highest malaria risk and which are accessible. The Rural Malaria Co-ordinator (RMC) is responsible for 10-20 villages. The RMCs conduct censuses and supervision. The government provided nets to cover 60% of the population. The nets are sold in the villages and money is raised to buy and sell nets to cover the rest of 40% of population. The villagers decide on net prices. And usually prices are set at 2/3 of the commercial prices.

Coverage is reported to be 50% and treatment rates are 70%. Nets are treated free with permethrin (200mg/sq.m) or deltamethrin (15mg/sq.m) (Chavasse *et al*, 1999).

In Kenya, the public/private multi-partnership collaboration through Bamako Initiative conducts an ITNs project. The project was centrally organised by PHC unit in MOH and district level is co-ordinated by DHMT and other government bodies for example the Division of Vector Borne Disease (DVBD) in Kisumu district. At community level the project is implemented through community pharmacies. The government provides

technical support, UNICEF organises procurement and distribution to community level and nets are sold at community at prices decided by community. The funds generated are at disposal of the community to purchase further treated nets or other PHC supplies or to initiate in come generating activities.

Nets are treated with permethrin (200-500 mg/sq.m).

Less than 20% of nets distributed are treated every year. The low rates of treatment is due to insufficient emphasis on promotion of treatment as well as logistic and management problems (Chavasse *et al*, 1999).

In the Gambia, MOH with financial support from UNICEF and WHO focuses on treatment of nets through supply and distribution of insecticides. Like Kenya in the Gambia no vertical malaria staff structure and treatment is implemented through PHC system. The DHMT collects insecticides from central level and distribute then to Community Health Nurses (CHNs) who are each responsible for 6-8 villages. CHNs distribute to Village Health Worker (VHW) or responsible person in villages without a VHW who supervises mass treatment of nets with permethrin (500mg/sq.m).

At the start of the project when treatment was free treatment coverage was 80%. When project started charging this fell to less than 20%. This reduction has been partly attributed to the supply problem. After seven years of charging, there is evidence that the rate of re-treatment is arising again (Chavasse *et al*, 1999).

The Turiani hospital in Tanzania operates an ITN project since 1993. The project is supported by an NGO. The project covers 23 villages around the hospital. Net materials were formally imported outside the country and were made into nets by the hospital

tailor and his family. The project then changed the procedure and started to buy ready-made net and sell them through Maternal and Child Health (MCH) clinics once per week. Treatment of nets was done using permethrin (500mg/sq.m) in front of a buyer. The date of treatment is then written on the net.

When treatment of nets was free, rates of re- treatment were very high but then fell dramatically after introducing dipping charges.

The money generated is used to buy new nets (Chavasse *et al*, 1999).

The cited examples of ITNs projects give hope for a successful implementation of the programmes of varied scales.

However, careful planning is advocated and is crucial to successful and sustainable of ITN programme. Collection of epidemiological data, social-cultural, economic and logistic information is used to decide whether the program is feasible to introduce. If so, goals and objectives as well as roles of different organisations are defined. Then technical decisions are made and implementation approaches are decided. Thereafter, plan is developed and implemented according to developed time frame (Chavasse et al, 1999).

The safety aspect of ITNs project in terms of bringing hazard to people, non-targeted organisms and the environment due to synthetic chemical is worth mentioning.

Synthetic chemicals can present short or long term hazard to both humans and other non-targeted organisms and to the environment. Pyrethroids have no tendency for bio-accumulation contrast to DDT. Pyrethroids break down rapidly both in mammalian tissues and in the soil. The toxicity to fish and other aquatic organisms, however, has

important consequences for waste disposal. Pit latrines, in which pyrethroids degrade quickly, are recommended for this purpose.

The rapid breakdown in tissues means that the main hazards of pyrethroids are related to acute rather than chronic exposure.

There had been reported cases of acute pyrethroid poisoning in the Chinese medical literature. He [1989] reporting pyrethroid poisoning; five out of the seven deaths of reported cases were more likely of pyrethroid poisoning (He *et al*, 1989).

Side effects vary from non- specific, transient symptoms of mild intoxication, such as headache that one feels during dipping which can be avoided by dipping in open air to allergic reaction such as asthmatic attacks.

From the Bagamoyo ITNs trial experiences there were no reported severe or fatal illness due to pyrethroid poisoning. The stories may circulate as rumours (Chavasse *et al*, 1999). One may conclude that in the normal exposure of ITNs and careful handling of insecticides during treatment, it is not expected to cause any serious hazard.

In 1998 a large-scale ITNs programme was introduced at district level in Morogoro rural district. There is a need to conduct an evaluation study of this programme so to document its experiences for future use in other districts in the country.

Gacocki [1993] and [AID 1976] defined that an evaluation is based on the fact that while appraisals are done before an investment is made, evaluation enters the stage after such a programme is under way or has reached a certain stage in its development. WHO (1981) defined evaluation as a systematic way of learning from experience to improve current activities and to promote better planning by careful selection of alternatives for future

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METHODOLOGY

The Study Site

The study was conducted in Morogoro rural district from 5th to 30th June 2000.

The Morogoro rural district has an area of 19,250sq.km. The district can be divided into three geographical zones. The mountainous or highland zone covers the Uluguru Mountains with altitude of 1,200-2,000 m above sea level and clay type soil. This zone covers about 25% of the district area, and is densely populated. The zone is suitable for the production of maize, beans and fruits. Cash crops are cardamom and coffee.

Semi- mountainous or low land zone covers a great part of the Morogoro south. The zone occupies 20% of the total are of the district with an altitude of 800-1200 m above sea level and has loamy type of soil. The zone is suitable for production of maize, cassava, and sorghum as staple food crops. Cotton, sunflower and sisal are grown as cash crops.

Savannah zone covers 55% of the district with an altitude of 600-800 m above sea level loamy type of soil. Paddy, maize and cassava are gown for both food and cash crops. Sugarcane, cotton and sisal are cash crops. Selous Game Reserve is also in this zone.

In the district there are rivers and valleys. Rivers include Mgeta, Ruvu, Wami and Mkindo. The district has a total road network of 1,164 km of which 188 km are trunk roads managed by the National level, Regional government manage about 331 km of roads and 334 km are feeder roads. The trunk roads are tarmac and the rest rough and become nearly impassable during rainy season. The railway line from Dar es Salaam to Kigoma and Mwanza and the TAZARA railway line from Dar es Salaam to

Kapirimposhi in Zambia pass through this district with several railway stations along this line.

Telephone and radio-call services are in few places. No fax or Telex services.

Electricity covers only 1% of district and mainly found in trading centres. Administratively, the district is divided into 11 divisions, 42 wards and 222 villages.

According to MOH [1997] the projected total population of Morogoro rural district for the 1999 is 536108, 52.8% are females and 47.2% are males. Children under one year are 21,444 and under fives 107,222. Women aged 15-49 years of age are 107,222. The population density is 28 per person per sq.km.. The average household size is five people. Main tribes include the Waluguru, Wakutu and Wazigua.

Vital Statistics

DEMOGRAPHIC FACTS	DISTRICT RATE/RATIO	NATIONAL RATE/RATIO
Annual Growth Rate	2%	2.8%
CBR	46/1000	46/1000
GFR	222/1000	222/1000
TFR	6.59	6.7
CDR	22/1000	15/1000
IMR	145/1000	115/1000
MMR	977/100000	529/100000
LIFE EXPECTANCY AT BIRTH	Females 48 Males 45	50 47

OUTPATIENT DIAGNOSES – HMIS 1997

Rank	Disease Problem	No. of cases under 5	Reported above 5	Total	% of total reported case
1.	Malaria	72,365	113,185	185,550	47.6
2.	ARI	38,410	52,490	90,900	23.3
3.	Diarrhoea diseases	12,621	17,933	30554	7.9
4.	Intestinal worms	7754	17991	25745	6.6
5.	Minor surgical condition	2306	14469	16775	4.3
6.	Eye infections	6065	9474	15539	4.0
7.	Skin infection	5,920	9489	15,409	4.0
8.	PID	-	3132	3132	0.8
9.	GDS	45	2614	2659	0.7
10.	PEM	1523	310	1833	0.5
11.	GUD	56	1240	1296	0.3
TOTAL		147065	242327	389392	100

Design of the Study

The study was cross-sectional and descriptive in nature and was conducted in three villages of three divisions of Morogoro rural district where the ITNs programme was first introduced.

Study sites

Each village was randomly selected among other villages in respective divisions. The selection was conducted in DMO's office. The villages selected were Fulwe in Mikese division, Kipera in Mlali division and Ngerengere in Ngerengere division. The distances and directions of each village from Morogoro town are as follows: -

Fulwe – 30 km to North East

Kipera – 23 km to South- west and.

Ngerengere – 90 km to the East

The three villages were all situated in the low lands and malaria endemic areas.

Fulwe village is situated along the Dar es Salaam – Dodoma road. The village occupies an area of 68 sq. km with a population of 5020 people. There is no health facility in the village. The nearest dispensary is situated about 4-5 km from the village. There is one primary school in the village. People get water mainly from wells. There is also a piped water supply from Ngerengere River to quarters of workers who take care of the Tanzania Zambia pipeline.

The inhabitants of the village are predominantly Waluguru, and are either Muslims or Christians.

Main activity of the people is farming. Food crops include maize, millet and cassava. Sesame, tomatoes and banana are cash crops.

Kipera is situated 10 km off the Morogoro – Iringa road. The village occupies an area of about 72 sq. km and has a population of 4,213. There is no health facility in the village but people get health service from Mlali dispensary which is about 1 km from the village government headquarter of the village. In the village there is a primary school and people get water from rivers.

The inhabitants of the village are mainly Waluguru.

Muslim and Christianity are main religions of the people in the area.

Main activity of the people is farming. Here people cultivate maize, rice and millet as food crops while tomatoes, unions and vegetables are cultivated as cash crops.

Ngerengere village is situated 20 km from Dar es Salaam – Morogoro road. The village occupies about 160 sq. km and has a population of 4,864. Headquarter of the village is a trade centre of a minor settlement. The area is characterised by presence of hills and valleys.

There is a health centre and 3 parastatal and private dispensaries. In the village, there is an army camp.

The inhabitants of the area are mainly Waluguru who are either Muslims or Christians.

Main activity of the people is farming. Crops like maize, millet and cassava are food crops while sesame is a cash crop.

The study population only included women who were taking care of children.

Structured interviews and physical checks on the presence of treated or untreated ITNs were conducted.

The other study units of interest were the ITNS programme implementers in the PHC system. Designed structured interviews were conducted in obtaining Information from the implementers. In order to support or complement these quantitative studies, two focus group discussions were conducted in each area of the study. Other interviews included in-depth individual interviews with district hierarchical system of leadership, starting with leaders from district to village levels. Treated nets were defined as nets that were treated with insecticides within three months.

The delivery system of nets and insecticides is as follows: -

Formally PSI used to supply nets and insecticides. But then DHMT felt that the prices of the commodities were higher then if were bought directly from a manufacturer (factory). A contract agreement was then made between DHMT and a manufacturer of nets and insecticides of A to Z factory based in Arusha. Since then the supply had been not running without a problem either because of the factory failure to meet demand or because of the DHMT failure to submit money to the manufacturer on time. The later explanation is that there is failure in collection money for commodity sales from health facility on time due to financial handling problem at health facility level. But, could be also explained that nets and insecticides are not selling fast in the health facilities because either cash flow in the community is seasonal or the outlets of the commodities to the community are more or less limited to facility health workers.

Other wise nets and insecticide are bought from A to Z factory based in Arusha by DHMT and are temporarily stored at the district health department store where these commodities are entered into a ledger. The commodities are then supplied to 9 selected health facilities which act as suppliers to other health facilities of respective areas. In the study area, the nets and insecticides are delivered to Mikese and Mlali dispensaries and Ngerengere health centre which are then the source of the commodities for Fulwe, Kipera and Ngerengere villages respectively.

Other outlets of the commodities at the district level are businessmen agents who are identified by their communities and also village health workers who can buy the commodities and sell them in their respective communities.

At the periphery health facilities the outlets are mainly people of the respective areas, village health workers and those in- charge of health facilities.

In this system, the end person who sells a net earns about Tshs100.00 from the sale of a single net that is sold at Tshs 2,500.00. In addition, the end person who sells an insecticide sachet earns Tshs 50.00 from a sachet that costs Tshs 400.00.

The village health workers are volunteers and are usually in financial constraints and therefore, they cannot buy the commodities for sale to their communities. Therefore, people go to a health facility to purchase the commodities. Because of financial control few health workers are involved in the sale of ITNs and insecticide.

From this background, it is obviously seen that the people who deal with, the ITNs programme are few, ie not all health workers in the PHC system.

In total 12 health workers, 5 village health workers and two personnel – a district accountant and a storekeeper at district headquarter were interviewed. Hence the total implementers who were included in the study were those who were directly acting in the study areas (n=19).

The following is the list of implementers and working place

IMPLEMENTERS	PLACE OF WORK
DISTRICT LEVEL	
■ DISTRICT ACCOUNTANT	
■ STORE KEEPER	
■ CLINICAL OFFICER	
■ PHNO	
■ Ag DNO	
■ Ag DHO	
FLHF LEVEL	
■ CLINICAI OFFICER	MLALI DISP
■ CLINICAL OFFICER	NGERENGERE HC
■ ASSISTANT CLINICAL OFFICER	MIKESE DISP
■ NURSE	MLALI
■ NURSE	MLALI
■ NURSE	MLALI
■ NURSE	MIKESE DISP
■ MCH- AIDE	NGERENGERE HC
COMMUNITY LEVEL	
■ VILLAGE HEALTH WORKER	FULWE VILLAGE
■ VILLAGE HEALTH WORKER	NGERENGERE VILLAGE.
■ VILLAGE HEALTH WORKER	KIDUNDE VILLAGE
■ VILLAGE HEALTH WORKER	KIDUNDE VILLAGE
■ VILLAGE HEALTH WORKER	SINYAULIMI VIL
TOTAL 19 IMPLEMENTERS	

In the study, about 210 mothers at household level were interviewed for the determination of use pattern of ITNs in the community. In the interviews 70 mothers in each village of study were included.

Sample Size

In the DMO's office it was learnt that there was a shortage of insecticide supply to the health facility and community; hence, there was expected a low proportion of treatment rate of ITNs in the community for the past months. The prevalence was estimated to be

around 16%. Then the following formula was used to get the 210 units of sample population.

$$n = \frac{Z^2 . P \times Q}{\in^2}$$

n = sample population

Z = standard normal deviate corresponding to 95% confidence interval.

P = proportion of mothers who use treated nets

Q = proportion of mothers who do not use ITNs

$\in$ = maximum error accepted

$$n = \frac{1.96^2 \times 0.16 \times 0.84}{0.5^2} = 206 \sim 210$$

The study sample population was then divided equally in the three study areas. In each village 70 mothers were interviewed.

Training of field assistants

Training of field assistants was conducted in Morogoro town. Three field assistants who were identified at their respective areas were recruited and trained. These field assistants were all primary-school teachers who completed Form IV and underwent teacher's training. All the field assistants were females. The training took two days of

practice and a day of testing questionnaires. The pre-testing was conducted to nursing students of one- year nursing course who were coming from the respective study areas.

In the field, the data quality was assured through frequent checking of their completeness. This was done at least 2 to 3 days. Missing information could be followed-up at least at reasonable time.

The study villages had 2-3 hamlets or sub- villages (vitongoji). In Fulwe and Kipera villages there were 2 hamlets in each. In Ngerengere village there were 3 hamlets. In Fulwe and Kipera villages, about 35 households of mothers were randomly selected from a kitongoji leader's list of the known mothers. In Ngerengere village 25 households of mothers were randomly selected as described above from Shuleni and Ngerengere hamlets. In Kambini hamlet 20 households were selected as above. The total number of households of mothers in each village was 70.

In-depth group interviews were conducted to two women and men groups in each village and to leaders in the hierarchical system from village to district levels.

Interviews with implementers covered availability of nets and insecticides (for treatment of nets), presence of messages and community mobilisation on use of nets and their treatment, presence of records and conduction of supervisions. These elements were aimed at finding out how much various people have fulfilled their roles in the ITNs programme.

The proportion of net use according to characteristics of mothers such as age, marital status and education were used to determine the use pattern of ITNs. The preferential

individuals in the family to sleep under nets at present time and in the past were also determined.

Group and individual leader interviews were used to generate results on sustainability of use of treated and to complement to programme implementers and mothers interview results on performance of implementers and affordability of community to buy nets.

In order to find out how much various people have fulfilled their roles the following indicators were used:

1. Availability of nets and insecticides.
2 Presence of messages and community mobilisation.
3 Presence of records.
4 Supervisory visits

RESULTS

Staff interviews

At the implementers level there were a total of 19 individuals at different health care levels. At the district level, there are six staff members assigned to the ITNs programme and all were interviewed while at health facility level, eight staff members were interviewed. At village level five village health workers were interviewed. In these interviews, questions were asked to get information about availability of nets and insecticides, channels of communication and IEC messages, proper record keeping and whether supervisory visits were done. The information is summarised in Table 1.

Table: 1 Responses of staff members implementing the ITNs programme on the indicators at different care levels

Performance indicators	District level n=6	Health facility level n=8	Village level n=5
Availability of nets regularly	All No	All Yes	3/5 Yes
Availability of insecticide regularly	All No	7/8 Yes	All No
Presence of IEC messages	billboards, posters, stickers, T-shirts and house to house visits and meetings All Yes	HE at working place All Yes	house to house visits and meetings All Yes
Presence of data records	All Yes	All Yes	All Yes
Supervisory visits	3 m = 4/6 Yes 6 m = 2/6 Yes No visits Non	3 m = All Yes 6 m = Non No visits Non	3 m = 4/5 Yes 6 m = Non No visits =1/5 Yes

Nets were not available regularly at district and village levels. All six implementers at district level confirmed that supply of nets was irregular. This observation was supported by two out of five of VHWs who reported unavailability of nets. However, all health workers interviewed in health facilities of study area reported regular availability of nets. The discrepancy in the responses of the interviewed on availability of nets could be explained that nets has not been in supply regularly at district level may be due delay in reception of the supply from the manufacture or due to high demand in the new programme extended areas. This also affects the availability of insecticide. At village level the irregular availability of the commodities could be explained that the supply to the community is more or less limited through a health facility out lets rather than having other outlets in the community, ie village health workers as suppliers. At health facility level the commodities seem to move slowly may be the sale is seasonal or may be not all people can go the health facility to buy the commodities because of far distance to a health facility.

It is important that insecticide availability should be regular in order to have high re-treatment rates at regular intervals. Clearly this was not the case. At the district and village level all the staff echoed that insecticide was not regularly available. Even at the health facility where nets were available regularly there was some problems with the supply of insecticide. Perhaps the low rate of re-treatment observed at household interviews can be due to unavailability of insecticide at all times.

For successful ITNs programme, IEC channels are important components. All the staff members confirmed that some IEC was available. At district level the common channels

of information were billboard messages, posters stickers distribution of T-shirts to various people as well as household contacts. At health facilities, health education in the form of oral presentation was the commonest channel. At the village level, there was an interactive process where health workers visited houses as well as provide information through village meetings. It was of interest to find the fixed channels along main roads and towns. These forms of messages though expensive are permanent and a constant reminder.

All 19 implementers do keep records on ITNs. The use of ledgers is practised at district and health facility levels. At community level, simple records of net sales provide valuable information on date of purchase, where customer lives, number of nets and insecticides sold, cash received and whether nets are being sold to new or existing net owners.

Supervision is also essential component of any community based intervention. Regular checks are necessary for monitoring the programme. About 84% of the staff had some contact with the supervisors in the preceding 3 months while 10.5% had such contact between 3-6 months. Only one village health worker reported that he never had any contact with a supervisor since he started dealing with net sales.

ITNs at the community level

At the community level, household interviews were conducted. Mothers in each of the selected household were the respondents. There were 70 households randomly selected

in each of the three villages: Fulwe, Kipera and Ngerengere. At these interviews the presence of nets was physically checked.

Table: 2 Net ownership in the 3 villages

ITNS	Fulwe	Kipera	Ngerengere	Total
Present	41(58.6%)	53(75.7%)	59 (84.3%)	153(72.9%)
Absent	29 (41.4%)	17 (24.3%)	11(15.7%)	57(27.1%)
Total	70(100.0%)	70(100.0%)	70 (100.0)	210(100.0%)

The availability of nets at household level shows variation. The lowest availability was seen in Fulwe (58.6%). People from Fulwe purchase their ITNs from the nearest health facility in Mikese that is some 5 km away while Kipera and Ngerengere villages the ITNs were available within their vicinity. Similarly, nets that were treated in the last 3 months were lowest in Fulwe 18.6% compared to Kipera (30.0%) and that of Ngerengere (37.1%).

In all three villages, people mainly get information about ITNs and insecticide from health care services (83%) and from VHWs (9.1%) as shown in the following Table.

Table: 3 Source of information about ITNs as reported by mothers interviewed.

Source of information	No of mothers	% of the mothers
Health facility	176	83.8
VHWs and others	19	9.1
No information at all	15	7.1
Total	210	100.0

Most of the people in these villages purchase nets and insecticide at the place where they get information about them. Therefore, the majority of the people (50.3%) buy the ITNs and insecticides from a health facility as shown in the following Table.

Table: 4 Source of nets in the community

Source of information	Number of mothers	% of mothers
Health facility	77	50.3
Shops	42	27.5
Street vendors (Wamachinga)	18	11.8
All above sources	16	10.4
Total	153	100.0

Other sources are shops (27.5%) and street vendors (11.8%).

Pattern of ITNs use

Where ITNs were seen in the household, mothers were specifically asked about who sleeps under the net. Surprisingly, almost 100.0% of children especially under fives were sleeping under the nets according to their mothers. This is also supported by the figures below where the highest age group using ITNs is mothers between age of 16-35 years.

Table: 5 Proportion of household members who slept under nets the last night

Members of the household	% of use
All individuals in the household	118 (77.1%)
Mother and child	32 (20.9%)
Mother and father alone	2 (1.3%)
Grand mother	1 (0.67%)
Total	153 (100.0%)

ITNs use according to age of mothers

Of the 210 mothers in the study 106 (50.5%) were of age group of 16-25 years and 69 (32.9%) of age group of 26-35 years. Other groups included of 36-45 years (10%) and of 46 and above years (6.7%).

Table: 6 ITNs use according to age of mothers

Age group in years Total		ITNs seen	Treated ITNs	Untreated ITNs
16-25	106	76 (71.7%)	23 (30.3%)	53 (69.7%)
26-35	69	56 (81.2%)	26 (46.4%)	30 (53.6%)
36-45	21	14 (66.7%)	8 (57.1%)	6 (42.9%)
46+	14	7 (50.0%)	3 (42.9%)	4 (57.1%)
Total	210	153	60	93

In addition among the users of ITNs, the age group of mothers 16-35 years had the highest use proportion of 75.4%. But, about 63% of these mothers their nets were not treated in the last 3 months.

Use of ITNs according to marital status

In the study sample there were 158 married mothers and 52 single mothers. The use of ITNs in this group is shown in Table: 7.

Table: 7 ITNs use according to marital status of the mothers

Marital status	Users of ITNs	Total
Married	122(77.2%)	158
Unmarried	31(59.6%)	52
Total	153	210

In Table: 7, Use of nets (treated or untreated) is higher (77.2%) in the households of the married than in those of the unmarried (59.6%). However, this pattern is also true regarding the use of treated nets. Out of the 122, 58.2% their nets were not treated. In the unmarried group out of 31, (71%) their nets were untreated.

Use of ITNs according to education level

The proportion of ITNs use was assessed according to the level of education as in Table: 8.

Table: 8 Proportion of use of ITNs, treated ITNs and untreated ITNs

Level of education	Mothers	Total nets seen	Treated ITNs	Untreated nets
No formal education	41	21(51.2%)	7(33.3%)	14(66.7%)
Incomplete primary ed.	13	3(23.1%)	1(33.3%)	2(66.7%)
Primary education	147	120(81.6%)	45(37.5%)	75(62.5%)
Secondary education	6	6(100.0%)	4(66.7%)	2(33.3%)
College	3	3(100.0%)	3(100.0%)	0(0%)
Total	210	153(72.9%)	60(39.2%)	93(60.8%)

The highest net use proportion (100%) is found in households of mothers with secondary and also college education. Mothers who completed primary education were found to have a proportion of use of nets of (81.6%%) while of those of no formal education was 51.2%. The lowest use (23.1%) of use nets was found in mothers with incomplete primary education.

The highest (66.7%) proportion of untreated nets is in households of no formal education and of incomplete primary education groups followed by a proportion of 62.5% of primary education group. In the remaining groups either hardly found untreated nets (33.3%) or a complete absence of untreated nets.

In-depth group and leaders interviews

In-depth group interviews were done in 3 villages and the participants were women and men in separate groups. Individual interviews were done with leaders at all levels from village to district leaders.

Perception regarding causes of malaria

Majority of participants from both group and individual interviews mentioned that mosquitoe cause of malaria. "Mbu ambao wanasababisha malaria wanazaliana kwa wingi katika mazingira yetu machafu ambapo kuna vifuu vidimbwi na mijani inayozunguka nyumba zetu" to quote one participant of men group of Ngerengere. Literally, means that mosquitoes that cause malaria, in these poor surroundings in which coconut kernel shells, rain water and not cut grass surround our homes. All leaders interviewed mentioned that mosquitoes cause of malaria disease.

Information on the use of nets in the past

Information was sought from the group and individual participants regarding the use of nets before the programme started.

Overwhelmingly the participants expressed that very few people used nets in the past. In particular those who were employed as teachers, clerks etc and were migrants were using nets. Indigenous people were not using nets. However, currently there are many households that are using nets for protection against mosquito bites and prevention from malaria disease.

Perception of community in regard to service performance of implementers (actors) of the ITNs programme

Most of the participants interviewed said that the programme implementers were doing well in their work. "Whenever one wants to buy a net or insecticide is well attended and is given instructions how to use the nets and how to treat the nets". This is a quotation from some of the participants.

Information regarding affordability of nets and insecticide

Regarding affordability the majority of participants were of the opinion that one of the major hurdle for purchasing ITNs was adequate cash. Most of the people at current price (which is subsidised) are able to purchase but the issue is that they do not have cash all year round. However, fear was expressed that once subsidy is removed majority of the people may not be able to buy ITNs or the untreated due to competing priorities. The present market price ranges from Tshs 4,000-6,000.00 and this price will have a profound impact on net coverage as many cannot afford ITNs.

Information regarding sustainability of the use of ITNs in the programme

In order to have sustainability in the use of nets and insecticide in the community, many participants were of the opinion that at market prices of ITNs, program will not be sustainable. However, a few participants thought that the price of ITNs should be increased gradually so that the majority of the people will have purchased ITNs. With time and use of ITNs, people will realise the benefits of ITNs and therefore buy ITNs even at market prices. One lady said that the health staff should not get tired of teaching people regarding ITNs. Constant education and mobilisation will ensure sustainability.

DISCUSSION

An attempt was done to evaluate the implementation of ITNs programme using social market strategies in rural Morogoro. The programme started in 1998. This possibly is the first programme using social marketing in the country. Lessons learnt will perhaps be useful to initiate a national ITNs programme.

For the success and sustainability of the programme it is of paramount importance that nets and insecticides are constantly available. The availability of nets and insecticide regularly may be a motivational factor for members of community to purchase nets. Peasants do not have cash flow at all times and if a net is not available when the peasant has money it is a lost opportunity. In this programme the implementers confirmed that nets were not available regularly. This was especially mentioned at the district as well as at village level. These two points may be the important selling outlets and therefore ITNs need to be well in stock. The supply of insecticide was even more irregular than the nets. Re-treatment of nets is an important aspect of ITNs programme. For reducing the malaria disease burden the coverage of treated nets should be relatively high (< 80%). In the household interviews about 61% (Table: 8) of the nets had not been treated. This defeats the purpose of the programme.

Within a short time of existence of the ITNs programme in rural Morogoro, the majority of the people were aware of use of ITNs. It appears the established channels of communication through health care facilities have managed to filter the messages to the communities.

All implementers interviewed expressed the use of different message channels in conveying messages about ITNs and their treatment. However, there had been a small proportion of the people (7.1%) in the community who were still not aware of ITNs.

So, there is still a need to improve the IEC strategy. This was also expressed in the group interviews that long-term IEC strategy was necessary for sustainability.

Coene [1991] emphasised that the final out-come of a large scale implementation of malaria control with use of ITNs will equally depend on health education, on availability of bed nets at low costs, on the formulation of appropriate structures for the re-treatment and distribution of nets and finally on the sustainability of the whole initiative.

Record keeping is a good business practice. Record keeping is now part and parcel of many international programmes. For the ITNs programme, record keeping gives opportunity for monitoring and evaluation of not only implementation processes but also of changes in the malaria parameters.

In the study areas, it was found that all implementers keep records of ITNs programme. This is important for evaluation of the programme at any stage of its implementation.

Supervision is a function of management. So, it is important to supervise the implementers at all levels in the programme in order to assess progress and problems that might arise so as to solve them within accepted time.

In the study areas the supervisory visits were done within accepted interval time (of three months) for the majority of implementers interviewed. However, there existed a small number of those implementers who reported that they were visited for supervision at a longer interval and even one reported that he was never visited at all. This gives an

impression of a need to strengthening supervision to all implementers and particularly to those at lower levels.

Despite the fact that the prices of ITNs and insecticide are subsidised, the coverage of ITNs in the study area achieved only about 73%, and is predominantly of untreated nets. One of the factors that deter the people in the community to utilise the opportunity of subsidised price of nets and insecticide is more likely to be the invailability of ITNs at appropriate times. The majority of people do get information about nets and insecticide and buy the items from a health facility (Tables 3 and 4). Perhaps those individuals in the community who reside far from the health facility have difficulties in acquiring ITNs. This is supported by the fact that, people of Fulwe village who live far away from a health facility have low use of ITNs and re-treatment rate. However, people of Kipera and Ngerengere villages have easy access to ITN because they can buy the items within their vicinity.

In this study, the use of ITNs was influenced by the mother's age. It was found that young mothers below 35 years had a higher use of ITNs compared to older age group. Possibly these mothers are primary school leavers, have opportunities for income generation and therefore in a better position to purchase ITNs.

From interviews and physical checks on presence of nets, it was found that the children of these mothers do sleep under nets. Hence majority of the malaria risk groups are protected against mosquito bites. The small proportion of mothers interviewed included grand mothers who take care of orphan children and many of these mothers were found to have no nets. This has an implication in the approach of ITNs distribution at this time

of HIV and AIDS epidemic. Therefore, the only possible way to raise ITNs use coverage is to continue to have subsidies for such families.

In the study, it was found that the ITNs and their treatment use were much lower in the unmarried mothers or single families.(Table7). In such families possibly parental care is compromised and maybe funds are not available nor is family advice for purchase of ITNs and insecticide. May be subsidy to such disadvantaged groups should continue. However, the community should take the responsibility to identify such families.

In this study, it was found that the net use increased with level of education of mothers (Table 8). This is probably matching with a common say that to educate a woman is to educate a family. This means that in a family in which the mother is educated, there is a higher chance that the family to accept the new technology of ITNs and their treatment. On the other side increase of level of education is also more likely associated with increase of in-come earning through employment and technical in-come generating activities.

In order to increase coverage of nets and re-treatment a Sector Wide Approach and multi-sectoral collaboration in which other sectors such as education, poverty alleviation should be collaborated in such community based health intervention programmes in which illiteracy and family financial constraints can be addressed.

From the group and leaders interviews, it was found that mosquitoes and poor environmental sanitation are the main causes of malaria disease and they can protect themselves against mosquito bites and the malaria disease by use of ITNs.

The WHO [1993] advocated the use of integrated public health approach in which together with other elements, the improvement of environmental sanitation at all levels, as well as, the use of ITNs and early attending medical care for patients is the best strategy to fight against malaria. As the community in rural Morogoro are aware and many (as reported from group and individual interviews) do use ITNs, it is now time to mobilise the people not only for the use of ITNs but also for improvement of their environmental sanitation in order to reduce mosquito breeding sites.

It was a concern of the group and individual (leaders) interviewed participants that, cash flow in the community is not constant but rather is seasonal. The cash flow takes a peak particularly during crop harvest. This is important information for setting strategies to increase the ITNs use coverage. That means the availability of ITNs and insecticides should be adequate at this time of the year.

From the study, it was understood that participants of in-depth group and individual interviews were also concerned with the sustainability of the programme. The majority of the participants were of the opinion that people should be mobilised more for the use of ITNs and their treatment. The current prices of ITNs in the programme should be increased gradually so that, with time the people will acquire the culture of use of treated ITNs. In this way later on, the people will give priority of buying the ITNs and insecticides at market prices.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This ITNs programme is of its own kind and the first exposure of DHMT in mounting such a programme for malaria control using social marketing strategy to distribute ITNs. To a large extent the programme in its initial phase has performed well in awareness creation to the people in the communities for the use of ITNs. The programme is on-going and the potential for achieving the laid down objectives is high. There are some areas that require more efforts by the implementers e.g.,

- Constant supply of ITNs at all health care facilities.
- To increase ITNs coverage in the community by making ITNs available from the additional outlets apart from health care facilities.
- To increase re- treatment level by ensuring availability of insecticide and mass educational campaigns.
- To plan strategies of how to sustain this programme when subsidy is over.
- To consider Sector Wide Approach and multi-sectoral collaboration for a long-term sustainability of the programme.
- To bear in mind that the ultimate goal of reduction of malaria morbidity and mortality and that ITNs programme is just a component of the strategic elements of malaria control.

Recommendation

1. All efforts should be done to attain constant supply of ITNs and insecticide at all levels to achieve this there is a need to review the whole delivering system of the programme.
2. To find modalities of how to increase community outlets of ITNs and insecticide.
3. To increase efforts for mass educational campaigns for the use of ITNs and their re-treatment.
4. To have studies on mechanism for differential prices.
5. To adopt and adapt Sector Wide Approach and multi-sectoral collaboration in ITNs programme for long term sustainability.
6. As the people seem to be aware of attribution of poor environmental sanitation in the creating good environment for breeding of mosquitoes and as a consequence malaria disease; mass campaigns for the improvement of environmental sanitation at all levels should be conducted.
7. To reinforce medical care for malaria patients.

REFERENCES

AID (1976), Evaluation Handbook second ed. Agency for International Development, Washington DC pp 1-2

Chavasse, D. Reed, C. and Attawell, K. 1999. Insecticide Treated Nets, ITNP, A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 p 2.

Chavasse, D. Reed, C. and Attwell, K.1999. Improved Personal Protection, ITNP, A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 p 3.

Chavasse, D. Reed, C. and Attwell, K. 1999. Private Sector, ITNP, A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 p149.

Chavasse, D. Reed, C. and Attwell, K. 1999. Planning and Implementation Steps, ITNP, A Hand book for Managers, Malaria Consortium, London and Liverpool 1999 pp 7-

Chavasse, D. Reed, C. and Attwell, K. 1999. Use of ITNs in China; ITNP, A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 pp 156-159.

Chavasse, D. Reed, C. and Attwell, K. 1999. ITNs use in Papua New Guinea; ITNP, A Handbook for Managers, Malaria Consortium London and Liverpool 1999 pp 154-155.

Chavasse, D. Reed, C. and Attwell, K. 1999. ITNs use on The Philippines, ITNP, A Handbook for managers, Malaria Consortium, London and Liverpool 1999 p154.

Chavasse, D. Reed, C. and Attwell, K. 1999. Government of Kenya/ UNICEF Bamako Initiative, ITNP, A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 pp 156-157.

Chavasse, D. Reed, C. and Attwell, K. 1999. The Gambia; ITNP; A Handbook for Managers, Malaria Consortium, London and Liverpool 1999 p158.

Chavasse, D. Reed, C. and Attwell, K. 1999. Turian Hospital, Tanzania, ITNP, A Handbook for Managers, London and Liverpool 1999 pp 162-163.

Clyde, D.F.1967. Species of Plasmodia, Malaria in Tanzania, Oxford University Press 1967 p 4

Coene, J. 1991. Prospects for malaria control in urban and rural Kinshasa, Ann Soc Belg Med Trop, 71 Suppl 1 pp 103-12.

Fivawo, M. 1985. Malaria in Tanzania, Community Response to Malaria in Muheza district, Thesis, Urban Illinois University 1986 pp 3-4.

Fivawo, M. 1985. Effect of Malaria to Pregnant women and Children, Community Response to Malaria in Muheza District, Thesis, Urban, Illinois University 1986 pp 88-89.

Gacocki, J.N. Process Evaluation of two Community Based Child Growth Monitoring programme in Embu District, Thesis, University of Nairobi 1993 pp 10-13.

Gilles, H.M. Warrell, D.A. Bruce- Chwatt's Essential Malariology third ed. Arnold 1993 p 46.

He, F. Wang, S. Liu, L. Chen, S. Zhang, Z. Sun, J. 1989. Clinical Manifestations and Diagnosis of Acute Pyrethroid Poisoning, Archives of Toxicology 63 1989 pp 54-58.

Lankinen, K.S. Bergstrom, S. Makela, P. and Peltomaa, M. 1994. Introduction to Malaria, Health and Disease in Developing Countries, Macmillan Press Limited, Hong Kong 1994 p147.

Lankinen, K.S. Bergstrom, S. Makela, P. and Peltomaa, M. 1994. Malaria Parasites and Antigens, Health and Disease in Developing Countries, Macmillan Press Limited, Hong Kong 1994 p 147.

Lengeler, C. Cattani, J. and de Savigny, D. 1996. From Research trials to Effective Community Based Interventions, Net gain, Draft Copy, WHO/ IDRC, Geneva and Ottawa 1996 pp 9-12.

Lengeler, C. Cattani, J. and de Savigny, D. 1996. Impact of ITNs on malaria morbidity and mortality, Net Gain, Draft Copy, WHO/ IDRC Geneva and Ottawa 1996 pp 6-9.

Lengeler, D. Cattani, J. and de Savigny, D. 1996. Side Effects of ITNs, Net Gain, Draft Copy WHO/ IDRC Geneva and Ottawa 1996 pp 36-37.

Matteson, P.C. Allsopp, R. Khaware, R. K. Kumar, P. Langer, J. Liroff, R.A. Mullins G.R. and Ramez, J. 1998. Insecticide Treated Nets, Disease Vector management for Public Health and Conservation, WWF Washington DC 1998 p 4.11.

Matteson, P.C. Allsopp, R. Khaware, R.K. Kumar, P. Langer, J. Liroff, R.A. Mullins, G.R. and Ramez, J. 1998. Sustainability of ITNs Interventions, Disease Vector Management for Public Health Conservation, WWF Washington DC 1998 p 6.5.

MOH (1994), Health Sector Reforms p 73

MOH (1998), Health Facility Morbidity and Mortality Statistics, Health Statistics Abstract pp 1, 6-7, 11-12.

MOH (1998), AMMP Data, Health Statistics Abstract pp 105-114

MOH (1990), Decentralisation to Regions and Districts, National Health Policy pp 7-9

MOH (1997), Personal Protections, Prescribers' Manual for Diagnosis and Management of Malaria in Tanzania, (Part 1- Learner's Guide) pp 8-9

Muhondwa, E.P.Y. 1986. Rural Development and Primary Health Care in Less Developed Countries Soc.Sci.Med.Vol.22 No 11 Great Britain.

Musil, R.K. Bahrambegi, R. Newsome, S. Perry, K. Garlfield, R. Johson, B.L. Orris P. Keyselling, H. and Walker, K. 1999. Public Statement on Malaria and use of DDT, The Modern Malaria Control Handbook, PSR, Washington DC 1999 pp 97.

Musil, R.K. Bahrambagi R. Newsome S. Perry, K. Garlfield R. Johnson B.L. Orris, P. Keyselling, H. and Walker, K. 1999. Vaccines, The Modern Malaria Control Handbook, PSR, Washington DC 1999 PP 91-92

Mwaluko, G.M.P. Kilama, W.L. Mandara, P.M. Murru, M. and Macpherson, C.N.L. Malaria; Health and Diseases in Tanzania, Harper Collins Academic 1991 pp 117-128.

WHO (1981), Health Programme Evaluation, Guiding Principles for its Application in Managerial Process for National Health Development. WHO "Heath for All" Series No 6 Geneva PP 16-19.

World Bank. 1993. World development report 1993: investing in health. Oxford University Press, New York, NY, USA. P 329.

WHO (World Health Organisation) 1994. World malaria situation in 1992. Weekly Epidemiological Record, 21 Oct 1994, pp 309-314.