THE ROLE OF DRUG SELLERS IN THE MANAGEMENT OF UNCOMPLICATED MALARIA IN KINONDONI MUNICIPALITY

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE UNIVERSITY OF DAR-ES-SALAAM

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the University of Dar-es-salaam a dissertation titled "THE ROLE OF DRUG SELLERS IN THE MANAGEMENT OF UNCOMPLICATED MALARIA IN KINONDONI MUNICIPALITY" in partial fulfillment of the requirements for the degree of Master of Public Health.

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Date 13-October 2003

DECLARATION

I hereby solemnly declare that, this dissertation is my original work, and that it has never been submitted for a diploma or degree in any other university.

Candidate's signature: _____

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Date 13. 10. 2003

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DEDICATION

This work is dedicated to my parents,

My beloved wife Maryam and

My loving children Rahma and Rukia

ABSTRACT

A cross-sectional survey was undertaken in Kinondoni Municipality during May-June 2003, to explore the role of drug sellers in the management of uncomplicated malaria. A total of 200 drug sellers were interviewed.

The results of this study indicated that over 90% of the drug sellers mentioned mosquitoes as the cause of malaria. About 90% of these drug sellers mentioned ITNs as the key measure in malaria prevention. Headache (90%), joint pains (65%) and fever (64%) were the common symptoms of malaria mentioned by the drug sellers. Fansidar (96.5%), Amodiaquine (81.9%) and Quinine (43.7%) were mentioned as the drugs that are recommended for the treatment of uncomplicated malaria. Of the mentioned correct dosage for adults, SP was (86.5%) and Amodiaquine was (94%), while the correct dosage for children was SP (67%) and only 19.5% for Amodiaquine.

About (48.5%) of the drug sellers advise their customers to buy a half dose of antimalarials. In simulated customer interview only (55.6%) of the drug sellers interviewed gave instructions which were clear to the customers and only (44.4%) were correct. Only 18% of the drug sellers requested prescriptions before selling antimalarials.

It was concluded that despite having good knowledge on new recommended anti-malarial drugs, the drug sellers do not conform to the required regulations in the treatment of malaria according to national malaria treatment guidelines. These results emphasize need to give more education to the drug sellers on the correct treatment of uncomplicated malaria.

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ACRONYMS AND ABREVIATIONS

AQ Amodiaquine

CQ Chloroquine

DED District Executive Director

JICA Japan International Co-operation Agency

ITNs Insecticide Treated Nets

KI Karolinsika Institutet

MOH Ministry of Health

MUCHS Muhimbili University College of Health Sciences

SP Sulfadoxine-Pyremethimine

TRA Tanzania Revenue Authority

RMA Rural Medical Aid

MA Medical Assistant

CHAPTER 1

1.1 INTRODUCTION

Malaria is a disease caused by the protozoan called plasmodium. There are four species of plasmodium namely; *Plasmodium falciparum, Plasmodium ovale, Plasmodium vivax* and *Plasmodium malariae.* The commonest plasmodium species in almost all parts of Africa, which accounts for 98% of all malaria cases, is *Plasmodium faclciparum* (MOH, 2001). This species is also associated with significant mortality. The disease is transmitted by the bite of an infective female Anopheline mosquito;

Malaria is one of the major public health problems in tropical Africa. It is estimated that 500 million cases of acute malaria occur in the world each year, and that 90% of this burden is in sub-Saharan Africa (Nabaro, 1999). Approximately 1.5 - 2.7 million people die each year from malaria worldwide (WHO, 1994). In Tanzania over 30 million people are at risk of developing malaria and approximately 16 million cases occur annually, About 100, 000 people die due to malaria with most of the deaths occurring in under five year old children and pregnant women. (MOH, 2001).

There are many factors which, contribute to the persistence of this health problem in Tanzania. One of them is that Tanzania is a tropical country and has a high rainfall and high temperature pattern. This climate favors the breeding of Anopheline mosquito vectors and hence malaria endemicity in the country. The other factors are low-social economic status of the people, which leads to financial inaccessibility of health facilities, poor case management due to the reasons like lack of laboratory equipments for diagnosis, shortage of drugs, insufficient training of staff and lack of

supervision. As a result, patients are frequently diagnosed based only on clinical assessment, essential medicines are over prescribed, inappropriate dosages and patients are not informed about treatment regimens and importance of compliance (Nsimba et al., 2002).

Approximately 60% of all health facilities belong to the public sector, 30 percent belong to the private-not-for profit-sector while about 10% belong to the private-for - profit (MOH, 1997). The emergence of the private sector has the advantage of complementing the government in the provision of health services; the private sector also widens areas for consumer choice.

In Tanzania pharmaceutical products are classified into two types and have different regulations governing their sale (United Republic of Tanzania, 1978). Part one poison are those that require a prescription from a qualified physician, dentist or veterinary surgeon, and which may only be dispensed under the supervision of a qualified pharmacist. All antibiotics fall into this category. Part two poisons include pharmaceutical products that are more commonly used (e.g. analgesics and anti-malarials such as SP) and a prescription from a qualified physician, dentist or veterinary surgeon is not required. In general, premises licensed to stock part I poisons are referred to as pharmacies and they are registered by the Pharmacy Board, while those licensed to stock part II poisons are referred to as drug stores and are registered by appropriate Municipal or District Councils (United Republic of Tanzania,1978).

After reporting of chloroquine treatment failure in *Plasmodium falciparum* of above 70% in parts of the country, the government decided to introduce in August 2001 Sulfadoxine/Pyrimethamine (SP) to substitute chloroquine as the first line treatment

of uncomplicated malaria in the country and Amodiaquine as the second line treatment of uncomplicated malaria (Kitua et al,.1999).

However with the present practice in which these drugs are allowed to be sold by the private drug store sellers and shopkeepers over the counter without prescriptions, it is feared that high levels of resistance to SP will develop rapidly and shorten the life span of the drug, especially as SP is more prone to resistance development than other anti-malarials.

Given that the home-based malaria care is part of the national strategy, and private drug stores are also contributing to malaria care. It is pertinent to study their roles, strength and weaknesses, so as to identify deficiencies and thus be corrected where possible in order to enhance malaria control activities.

1.2 REVIEW OF LITERATURE

Malaria is a major health problem in the world, it is estimated that it kills between 1.5 – 2.7 million people every year (WHO, 1994). World wide approximating 500 million cases of acute malaria occur each year, and 90% of these are in sub-Saharan Africa (Nabaro, 1999). In Tanzania over 30 million population are at risk of developing malaria (MOH, 2001), approximating 16 millions cases of malaria occur annually and it kills about 100,000 people majority of them are under fives (MOH, 2001). The case fatality in fewer than fives is about 10% (MOH, 2001). The disease is common and more severe is pregnant mothers and children under fives (MOH 2001).

Malaria problem is worsening in the country and it accounts of 11-13% of all disease conditions in 1978 while in 1997 malaria was responsible for about 34% of all disease conditions in the country (MOH, 2001).

This worsening of malaria case in the country attributed to many factors, among them was rapidly development of chloroquine resistance to the plasmodium falciparum the parasite whose is responsible for the development of the malaria. The failure rate was reported to be above 70% in the part of the country (Kitua et al., 1999). This led the government to introduced sulfadoxine/ pyrimethamine (SP) to substitute chloroquine as first line treatment of uncomplicated the country and amodiaquine as the second line treatment (Kitua et al., 1999).

The other factors which was responsible for the worsening of the malaria problem in our country was due to the lack of laboratory equipment for diagnosis, poor supply of drugs, there was no clear treatment guidelines for malaria cases and insufficient

training and supervision of staff. This has led to patients were not proper dosages and were not informed about treatment guideline and the importance of compliance (Nsimba et al., 2002).

This led to under utilization of health facilities and majority of people started to manage malaria cases at community levels. In Tanzania between 70 – 80% of malaria cases are managed at community level (MOH, 2001) and majority of them are buying drugs from the shops and private drug store sellers. High proportions of these are children, in which when they get fevers they are managed at home by their caregivers and they are being sent at health facilities when this has failed or when severe complications occur. This high frequency of self treatment with anti-malarials was shown in the study done by (Nsimba et al 2002) in which 75% of people interviewed bought drugs form private 16% obtained drugs from neighbors and other people.

But this self medication with shop bought drugs and lack of information to community members on over the counter drug use, has led to wide spread ineffective treatment of malaria, increased risk of drug toxicity and accelerating drug resistance (Marsh et. Al., 1999).

In Tanzania shopkeepers and drug store sellers are allowed to stock and sell anti-malarials all over the country, but most of them are not given formal training on the proper treatment of malaria (Masselle et. al., 1993) with present prescription practices of malaria by shop keepers and drug store sellers, it is feared that high level of resistance to SP will develop rapidly and shorten the life span of the drug, especially as SP is more prone to resistance development than other anti-malarials.

Studies done to assess the knowledge of drug store sellers on SP and Amodiaquine dosage in treatment of uncomplicated malaria by (Minzi et al., 2002) in Dar es Salaam pharmacies and drug stores shows that about 43% of dispenser knew the correct dose of SP i.e. 25mg/kg body weight of the sulphonamide component of SP (500mg/tablet). About 57% of dispensers knew the correct dosage of amodiaquine i.e. 25mg/kg body weight spread over 3 days 10mg/kg for the first day and second day and 5mg/kg for the third day.

The other study on knowledge and management of malaria in Dar es Salaam by (Massele et. al., 1993) showed that only 20% of the drug store sellers knew the correct chloroquine dosage, 50% of the drug store sellers interviewed said they give advice to customers who buy drugs, but the quality of information given to these customers were not known.

1.3 STATEMENT OF THE PROBLEM

Malaria control in Africa relies primarily on early diagnosis and prompt effective treatment of the clinical disease. However most early treatment for fever occurs through self-medication at home, the medication is bought from the corner shops, kiosks and drug stores. It is estimated that between 70-80% of malaria cases in Tanzania are managed at community level (MOH, 2001). It has also been shown that in Tanzania high proportions of mothers who attend outpatient clinics for febrile illness of their children had initially start medication at home. This means that home-based management of fever cannot be ignored. Therefore the concept of home-based management has to be considered and promoted through proper understanding and support.

Historically in Tanzania in the health sector, private enterprises were looked upon as exploitive. With health sector reforms private sector is gradually being recognized as a partner in health care delivery. However inadequate information to community members on over the counter drug use has led to a widespread ineffective treatment of malaria and, also has lead to an increased risk of toxicity and accelerating drug resistance (Marsh *et. al.*, 1999).

Currently private drug store sellers and shopkeepers are allowed to stock anti-malarials, and they are sold over the counter without prescription. Therefore there is a need to study the level of knowledge and practice of these private drug store sellers and shopkeepers towards treatment of uncomplicated malaria according to the current treatment guidelines.

1.4 RESEARCH QUESTION

The research question intends to explore the level of knowledge regarding treatment of uncomplicated malaria according to national malaria treatment guidelines. In addition it will also investigate the current practices of these private drug store sellers and shopkeepers in malaria case management. Therefore, this research intends to address. First do the drug store sellers have adequate knowledge about the anti-malarias they dispense in terms of appropriate dosages by weight and age, and common side effects?

Secondly are they aware of national malaria treatment guidelines and their contents?

Thirdly is their practice in conformity with the national malaria treatment guidelines?

Therefore the drug store sellers' knowledge and practice forms a key to the partnership between private and public sector to improve malaria case management.

1.5 RATIONALE

In Tanzania, case management at health facilities is typically poor due to reasons like lack of laboratory equipment for diagnosis, under supply of drugs, no clear treatment guidelines and insufficient training and supervision of staff. As a result, patients are frequently diagnosed based only on clinical assessment, essential medicines are over prescribed in inappropriate dosages and patient are not informed about treatment regimens and the importance of the compliance (Nsimba et. al., 2002).

As an example, in another study by the MUCHS-KI team, Comoro and others in KI-MUCHS team (Comoro et al., 2003) found that rural Tanzania mothers commonly perceive severe malaria as *degedege*-an illness that can only be treated with traditional remedies while isolating the child from the outside world. However, even though their biomedically inappropriate treatment practices commonly are linked with ignorance and illiteracy, they may infact be culturally appropriate and logical way to cope with competing health concerns (Nichter andVukovic, 1994, Sachs and Tomson, 1992).

It is also found in Tanzania that, a high proportion of children with fever are managed at home by their care givers and will present at health faculties only when home management has failed or when severe complications occur. In these study high frequencies of self-treatment with anti-malarials, both in urban and rural communities were reported. Among those who reported self-treatment, 75% bought drugs from private stores (*Dukas*), 17% used home stored drugs they had obtained from health facilities, and 16% reported to obtain drugs from neighbors and other people (Nsimba et. al., 2002).

Obviously, the private and informal sector plays a significant role in fever case management and studies have shown that private drug retailers sell drugs upon patient demands, with poor quality pills being prescribed in inappropriate doses, resulting in drug resistance development or toxic adverse events (WHO, 1997). However, experiences from South-East Asia show that interventions can improve private drug store seller's outlets performance (Syhakhang, 2002, Chuck, 2002)

Therefore, this work intent to address an important part of home based management of malaria. Specifically it addresses the role of private sector hereto marginalized. The results of this study will reveal the current level of knowledge of shopkeepers and private drug store sellers in the management of uncomplicated malaria in the municipality, it will also reveal the current practice of these private drug store sellers and shopkeepers in malaria case management, and will therefore enable the National Malaria control programme and ministry of health to formulate appropriate malaria control policies that will further improve malaria case management.

1.6 BROAD OBJECTIVE

To assess the role of drug store sellers in the management of uncomplicated malaria in Kinondoni Municipality.

1.6.1 Specific objectives: -

1. To determine the socio-demographic characteristics of shopkeepers and drug store sellers
2. To assess the knowledge of shopkeepers and drug store sellers on use of anti-malarials in the management of uncomplicated malaria
3. To describe the dispensing practices of shopkeepers and drug stores sellers for anti-malarial case management
4. To assess the quality of information that shopkeepers and drug store sellers provide to the customers on buying anti-malarials.

CHAPTER 2

2.0 METHODOLOGY

2.1 The study area

The study was carried out in Kinondoni Municipality Dar es Salaam. It is among the three Municipalities that make Dar es Salaam City. Kinondoni Municipality is bordered by the Indian Ocean to the North East, Ilala Municipality to the South, Bagamoyo District to the North, Kibaha District to the West and Kisarawe District to the Southwest.

The land size of Kinondoni Municipality is 531km^2, which include both rural and urban areas. According to the 2002 census report, the population of the Municipality is 1,088,867(Bureau of statistics, 2003) many people from up country are coming to Kinondoni Municipality to look for employment in both public and private sectors. This trend has contributed much to the high population growth rate, which is 5.4% per annum.

The Municipality has four division and twenty-seven wards. The wards are sub divided into villages for the rural areas and sub wards (*mitaa*) in the urban areas.

The municipality experiences a modified equatorial climate; it is generally hot and humid throughout the year with an average temperature of 29^{0}C. There are two rainy seasons, the short rains season, which starts from October to December and long rains season between March and May. The climate favors malaria transmission almost throughout the year. The major economic activities in this Municipality are industry, retail business, agriculture, fisheries and bee-keeping. Kinondoni

Municipality has a total of 167 health facilities, owned by both government and private sector as follows: one district hospital owned by government and eight hospitals owned by private. Three health centers owned by government and other three by private.20 dispensaries owned by government, 121 by private and 11 by others (MOH, 1999). 80 pharmacies, 612 part II medical stores and 6,000 shops.

2.2 The study design: -

It is a descriptive cross sectional study, which was done in a four weeks period from mid May to mid June 2003.

2.3 The study populations

All drug store sellers working in part II drug stores and shopkeepers found selling anti-malarial in their shops are included in the study.

2.4 Calculation of the study sample size

Sample size was calculated by using the formula,

$N=z^2\ pq/e^2$

Where N= Expected minimum sample size.

Z= is a standard value which corresponds to 1.96 (at 95% CI)

P= knowledge of drug store sellers on SP and Amodiaquine dosage in treatment of malaria in Dar es Salaam 43 %(Minzi et al, 2002)

e = maximum likely error (at 0.07)

q = 1-p

Therefore,

$$N = \frac{1.96^2\ (0.43\ (1-0.43)}{0.07^2}$$

= 188

To take care of non-response, 10% of the sample was added to make a total of 200 dispensers.

For a simulated customer interview a random sample of 10% of the 200 dispensers was taken giving the following number; 10/100*200 =20.

2.5 Selection of the Study sample: -

The sampling method is a multistage stratified sampling. Two out of four divisions were selected randomly. A list of all wards in these two divisions was obtained from Municipal office; all drug stores that were found in these wards were selected randomly using table of random numbers. These were selected from the list of all drugstore obtained from the municipal pharmacist. All drug store sellers found in these drug stores were interviewed. Unfortunately, all the shops which were sampled none of them was found selling anti-malarials hence we did not interview any shopkeeper.

2.6 Data collection tools

The study instruments were as follows; a structured questionnaire, which consisted of both open-ended questions and close-ended questions. This tried to answer questions on socio-demographic characteristics of shopkeepers and drug stores sellers; also it tried to answer questions on assessment of the level of knowledge of shopkeepers and drug store sellers on use of anti-malarials in the management of uncomplicated malaria. Lastly it tried to answer questions on assessment of their practice in the management of malaria.

A simulated customer interview was also used, whereby a research assistant visited the selected drug stores and requested for an assistance claiming that he has a child

or a relative who was suffering from malaria and listened to the question asked, advise given by the drug store sellers, and to the type of medication given. After buying the medicines the research assistant walked out of the drug store and filled a questionnaire on what he observed during that interaction. This tried to answer questions on the dispensing practices of the shopkeepers and drug store sellers for anti-malarial case management also the quality of information that drug store sellers provide to the customers buying anti-malarials.

The order of interview was as follows, the research assistant dealing with simulation questionnaires visited the drug store first, followed by the one with structured questionnaires

2.7 Plan for data collection: -

2.7.1 Data collection

The research team consisted of one principal investigator and two research assistants. Data collection done between mid May' 03 and mid April '03.

2.7.2 Plan for data processing and analysis

For completeness and consistency in filling, all questionnaires were checked on daily basis, provided with serial numbers, and kept in separate files for analysis later. Computer using Epi-Info software programmes was used for entering data after coding all questions and answers. Using Epi-Info software programmes also did data analysis.

2.8 Ethical clearance: -

The Muhimbili University College of Health Sciences (MUCHS) Ethical Committee granted the ethical clearance permit. Permission to proceed with the data collection was obtained from Regional medical officer of Dar es salaam and District medical officer Kinondoni Municipality and District Executive Director (DED) The purpose of the study was clearly explained to the drug store sellers and informed consent was sought before the administering the questionnaire to the drug store sellers. Confidentiality was assured.

2.9 Pilot study: -

Pre-testing of the questionnaires was conducted in the same district in the divisions, which were excluded from the study. The tools pre-tested were the questionnaires for shopkeepers and drug store sellers also the questionnaire for simulated customer survey encounter.

2.10 Study limitations: -

The aim was to interview the shopkeepers and drug store sellers. However permission was needed from the owners to interview their employees. In some instance owners were not available and therefore, I could not interview some drug store sellers. I was at times perceived to represent the government authorities eg Pharmacy Board and TRA and this may have caused reluctances to some of the drug store sellers. No shopkeeper was interviewed as intended because they did not meet the inclusion criteria that is, their shops were not selling any anti-malarial.

CHAPTER 3

3. RESULTS

3.1 Socio-demographic characteristics of the study population.

A total of 12 Wards out of 27(44%) in Kinondoni Municipality were covered. These 12 Wards were obtained after randomly selecting two Divisions out of four Divisions in Municipality, and all Wards found in these two Divisions were selected. In these 12 Wards 200 drug stores were covered. The drug stores were randomly selected based on the list of all registered drug stores obtained from Municipal Pharmacist.

Of the studied drug store sellers 180 (90%) were females (mean age: 25.4 ±4.9) and 20 (10%) males (mean age: 30.6 ±6.9) (Table 1)

The marital statuses of the drug stores sellers were as follows: a high percentage of the drug stores sellers (72%) were not married. This reflects that a high percentage of these drug store sellers are of young age group, as it was shown by the mean ages of both female and male groups in (Table 1) shown below.

Table 1: Distribution of drug stores by Wards, mean age and sex of the drug store sellers in each ward.

Ward	No of shops	Mean age (x)	Sex	
			Male	Female
Kigogo	14(7.0%)	26.5	2	12
Kijitonyama	11(5.5%)	24.5	0	11
Kimara	18(9.0%)	25.9	0	18
Kinondoni	15(7.5%)	24.7	3	12
Mabibo	14(7.0%)	25.0	5	9
Magomeni	27(13.5%)	25.2	2	25
Manzese	18(9.0%)	27.5	2	16
Mburahati	8(4.0%)	24.0	0	8
Mwananyamala	8(4.0%)	28.1	0	8
Sinza	23(11.3%)	25.6	1	22
Tandale	15(7.5%)	25.9	1	14
Ubungo	29(14.5%)	27.0	4	25

When they were asked about their education background, the majorities of the drug store sellers (76%) had education background of secondary school and above, while those with primary education and below are only about 23% of all drug stores sellers (Table 2)

Table 2: Distribution of the level of education of the drug store sellers (n=200).

Education status	Frequencies	Percentage
No education	1	0.5%
Adult education	3	1.5%
Primary education	43	21.5%
Secondary education	152	76%
University education	1	0.5%

For the professional training, the majority of the drug store sellers (69%) were trained as Nurse Assistants, and only 9.0% of them were trained as Nurse Midwives. The other cadres were as follows: Rural Medical Aid and Medical assistants contributed about 10% of all drug store sellers, while Pharmaceutical Technicians contributed only 4.0% of all drug store sellers interviewed in this study (Table 3)

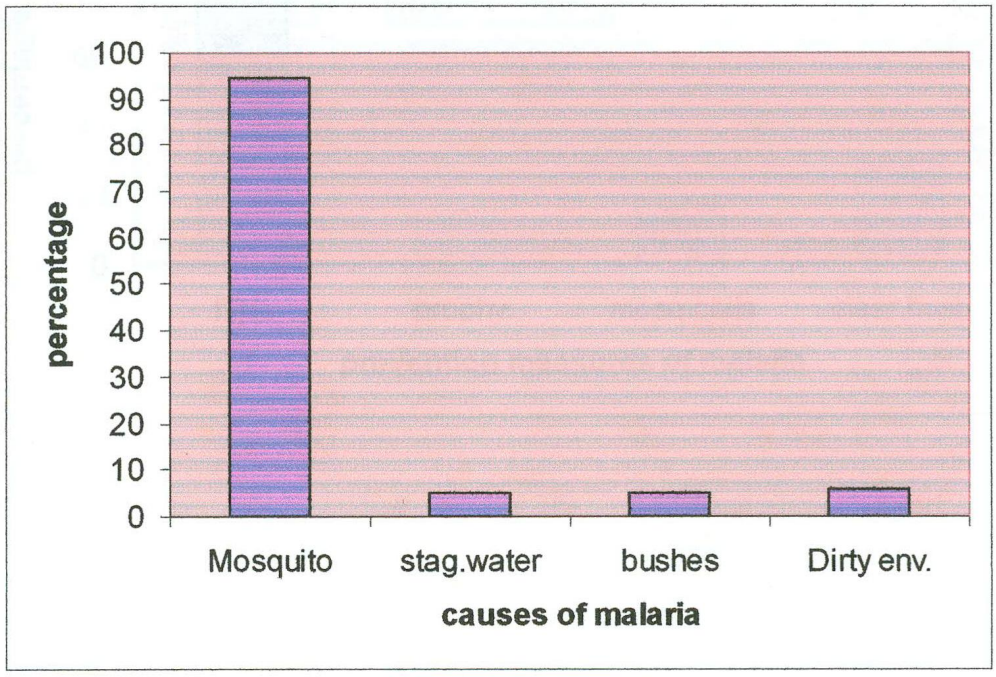
Table 3: Distribution of the drug store sellers by Cadre (n=200)

Profession	Frequencies	Percentage
N/ assistant	138	69.0%
N/ midwife	18	9.0%
Rural Medical Aid	2	1.0%
Medical Assistant	19	9.5%
Pharmaceutical technician	8	4.0%
Others	15	7.5%

3.1 Knowledge of the causes, symptoms and preventive measures of malaria.

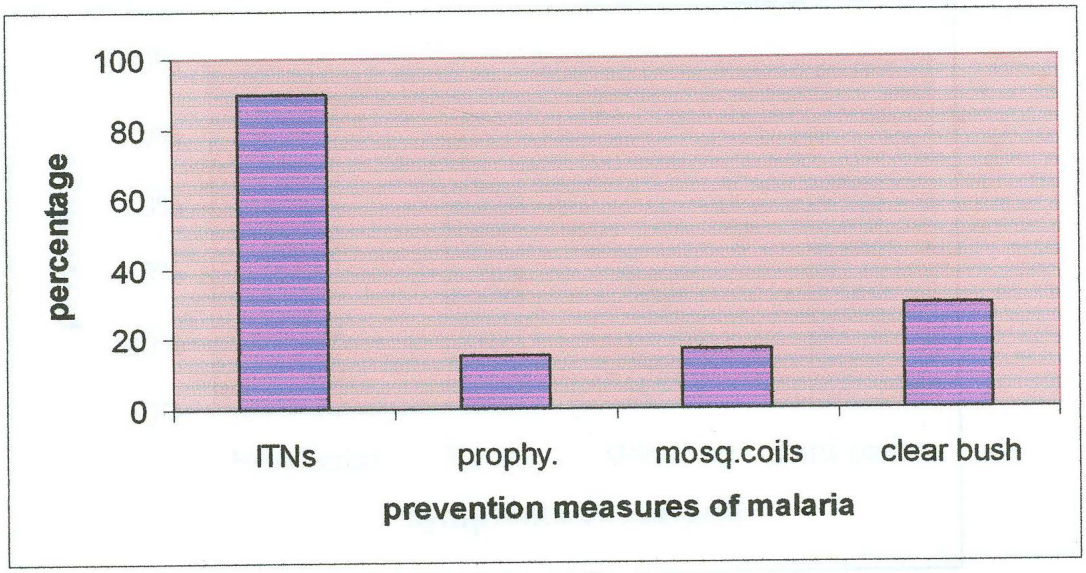
Regarding the causes of malaria, it is known that female Anopheline mosquito causes malaria, other factors are like dirty environments, stagnant water, and bushes around the houses are the breeding sites for these mosquitoes. When asked about the causes of malaria, the majority of the drug store sellers (94.5%) mentioned mosquitoes as the direct cause of malaria and about 22% mentioned the indirect cause of malaria as stagnant water, dirty environments and bushes around the houses. (Figure 1)

Figure 1: Knowledge of the causes of malaria as reported by drug store sellers.



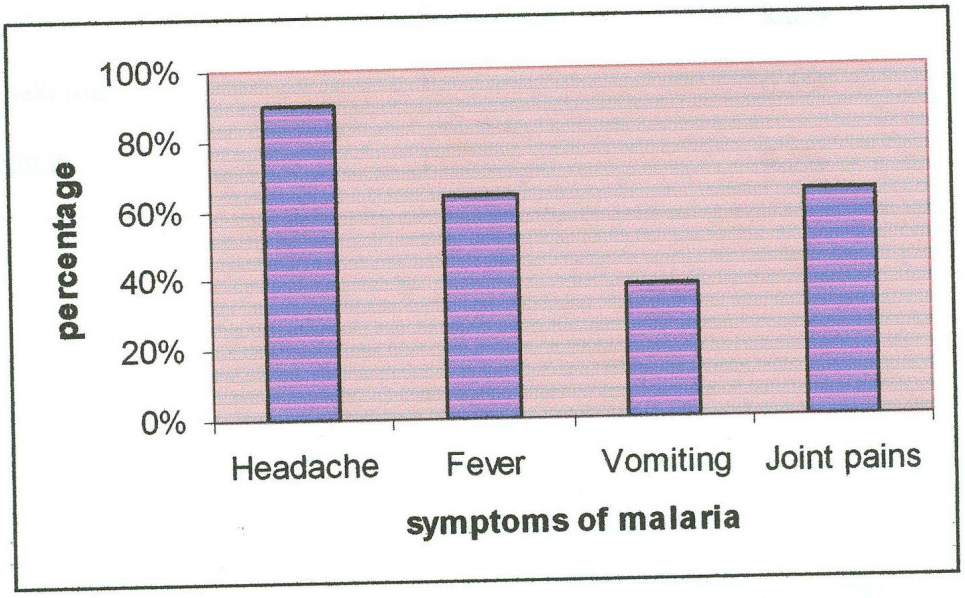
The majority of the drug store sellers (90%) mentioned use of ITNs as the one of the measures in prevention of malaria. Other preventive measures of malaria mentioned are; use of weekly anti-malarial prophylaxis (15%), use of mosquito coils (17%) and clearing of bushes and stagnant water around the houses (30%) (Figure 2).

Figure 2: Knowledge on preventive measures of malaria by drug store sellers.



The drug store sellers' knowledge on symptoms of malaria is of paramount importance particularly when it comes to the diagnosis of malaria, because it is their only way of detecting whether the customer is suffering from malaria or not. Of the studied drug store sellers (90%) of them mentioned headache as the commonest symptom of malaria, followed by joint pains (65%), fevers (64%) and vomiting (38%) (Figure 3).

Figure 3: Knowledge on symptoms of malaria by drug store sellers



3.2 Knowledge of the drugs, which are resistant in the treatment of malaria

The majority of the studied drug store sellers (96%) mentioned chloroquine as the drug, which is not effective in the treatment of malaria in our country, and it has been banned for the treatment of malaria in our country. (Table 4).

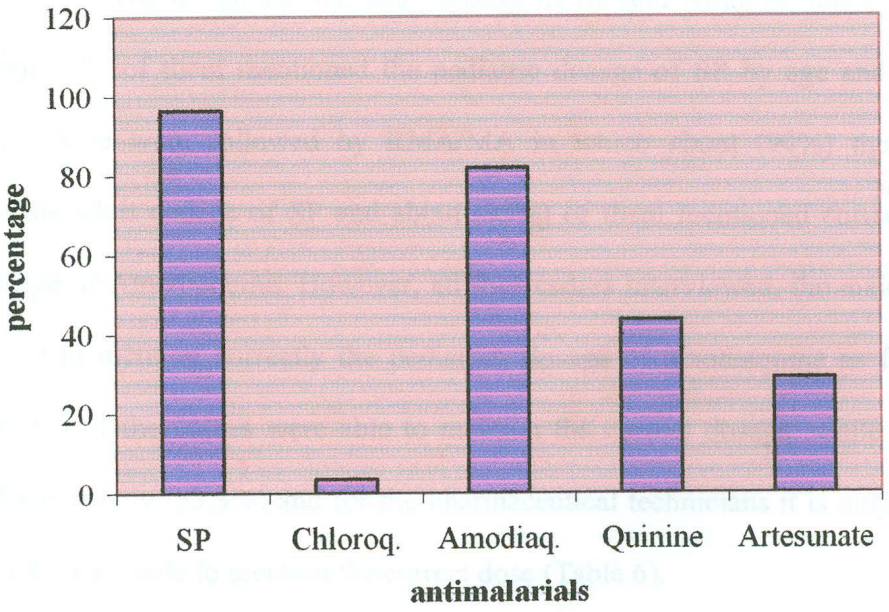
Table 4: Reported frequency of anti-malarial drugs which are not effective in the treatment of malaria (n=199)

Anti-malarial	Frequency	Percentage
Amodiaquine	1	0.5%
Chloroquine	191	96.0%
Fansidar	5	2.5%
Metakelfin	1	0.5%
Quinine	1	0.5%

3.3 Knowledge on new recommended anti-malarial drugs in our country

After Chloroquine was found to be not effective in the treatment of malaria, the Government decided to change to other drugs namely, SP and Amodiaquine for the treatment of uncomplicated malaria. When asked if they knew the new recommended anti-malarial drugs for the treatment of uncomplicated malaria, the majority of the studied drug store sellers (96.5%) mentioned SP as the new recommended anti-malaria drug for the treatment of uncomplicated malaria, followed by Amodiaquine (81.9%) and Quinine (43.7%). Also Artesunate was mentioned by about (25%) of the drug store sellers. (Figure 4).

Figure 4: Reported frequency of the recommended anti-malarial drugs in our country by the studied drug store sellers.



3.4 Knowledge on recommended dosage of anti-malarials by age group.

Of the studied drug store sellers, a high percentage of them were able to give a correct dosage of anti-malarial as recommended in the treatment of malaria in our country as follows; SP (86.5%) and Amodiaquine (94%) for the adult doses and SP (67%) for pediatric doses. Only a few of them (19.5%) were able to mention the correct dose of Amodiaquine for children (Table 5).

Table 5: Percentage of study subject with knowledge regarding correct dose of SP and Amodiaquine.

	SP	Amodiaquine
Adult	86.5%	94%
Child	67%	19.5%

Although not statistically significant (P-value >0.05), all Pharmaceutical technicians (100%) interviewed mentioned the adult dosage of SP and Amodiaquine correctly. And about 87% of them mentioned the pediatric dosage of SP by age and weight correctly. These were followed by RMA/MA in which about (90%) mentioned correctly the adult dosage of SP and about (95%) of them mentioned correctly the adult dosage of Amodiaquine. However, all four cadres interviewed, the majority of them failed to mention correctly the pediatrics dosage of amodiaquine as follows; only (18.6%) of the nurses were able to mention the correct dosage, while for the RMA/MA it is only (33.3%) and for the Pharmaceutical technicians it is only (25%) of them who were able to mention the correct dose (Table 6).

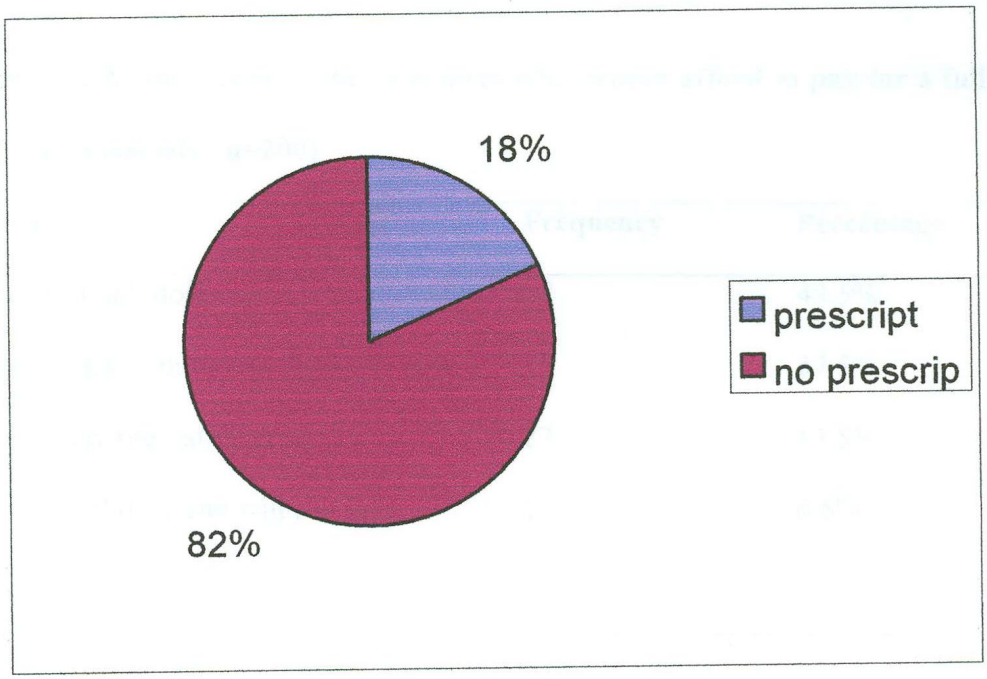
Table 6: Reported percentage of correct dosage of anti-malarials by cadres

Anti-malarial drug	Nurses	RMA/MA	Pharmaceutical technician	Others	P-value
Adult dose					
SP	133(85.3%)	19(90.5%)	8(100%)	13(86.7%)	>0.05
Amodiaquine	148(94.9%)	20(95.2%)	8(100%)	12(80%)	>0.05
Pediatrics dose					
SP	101(64.7%)	15(71.4%)	7(87.5%)	11(73.3%)	>0.05
Amodiaquine	29(18.6%)	7(33.3%)	2(25.0%)	1(6.7%)	>0.05

3.5 Drug store practice

The majority of interviewed drug store sellers (82%) were selling anti-malarials without prescriptions (Figure 5). This shows that anti-malarial drugs are treated as over the counter drugs and they are being sold without being prescribed by clinicians.

Figure 5: Distribution of number of drug store sellers selling anti-malarial drugs without prescriptions.



Of the studied drug store sellers, majority of them (79%) reported that occasionally some of their customers are not able to pay for a full dose of anti-malarial drugs, and among them (48.5%) advised their customers to buy a half dose instead, 37% advised their customers to go back and look for the money to buy a full dose of anti-malarial drugs and 13.5% advised their customers to buy an alternative drugs. Only 0.5% of them will give a full dose and the customer will pay later. (Table 7)

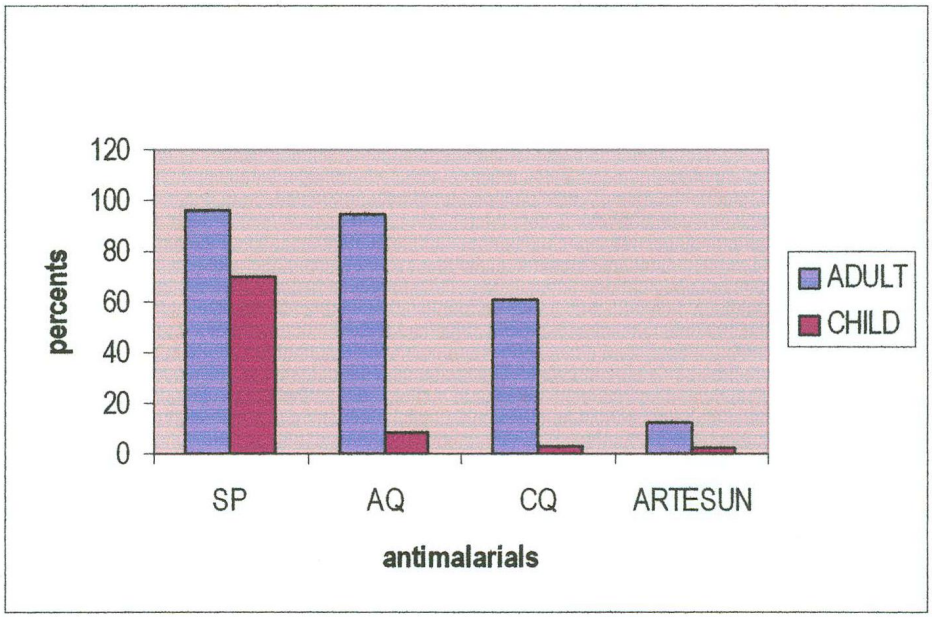
Table 7: Advice given to the customers who cannot afford to pay for a full dose of anti-malarials. (n=200)

Advice	Frequency	Percentage
To buy a half dose	97	48.5%
Come back with money for a full dose	75	37.5%
To buy an alternative drug	27	13.5%
Give a full dose and will pay later	1	0.5%

Drug store sellers were asked to mention the dosage for Anti-malarials for adults and children.

A high percentage of the studied drug store sellers were able to mention correctly the required number of tablets of Anti-malarial drugs to be sold for adult as follows; SP 96%, Amodiaquine 95%, and chloroquine 60.5%. Only 12.5% were able to mention correctly the required number of tablets of Artesunate to be sold to an adult patient. Regarding the required number of tablets to be sold to a child, majority of them were able to mention correctly SP (70%), but with other drugs the number dropped dramatically to only 8.5% for Amodiaquine, 3.0% for chloroquine and 2.0% for Artesunate (Figure 6).

Figure 6: Proportion of drug store sellers mentioning correct number of tablets of various anti-malarials.



Regarding the quality of information given to the customers after buying anti-malarial drugs, 81.1% gave instructions on how to use the drugs, 10.5% advised their customers to come back after seven days to give them feedback,7.9% advised their customers to see a doctor if fever persist (Table 8). Of the studied drug stores sellers (n=200) only 69(34.5%) gave advised to the customers regarding the side effects of the drugs.

Table 8: Types of information given to customers after buying anti-malarials.

Information	Frequency	Percentage
Information on how to use the drugs	154	81.1
To come back after seven days	20	10.5
To see the Doctor if fever persists	15	7.9
None	1	0.5

Of the studied drug store sellers only 34.5% of them, are reported to give their customers advice on side effects of the drugs which they have bought. (Table 9).

Table 9: Advice given to customers on side effects of the drugs.

Advice	Frequency	Percents
No advice given	131	65.5%
Advice given	69	34.5%

3.6 Simulated customer observations

We also visited 20 drug stores, in which the research assistant was pretending that he has a relative or a child at home who is suffering from malaria and observed actions taken by drug store seller and filled a questionnaire immediately after living the drug store. Eight wards were visited and sex distribution of the drug store sellers visited in each ward is shown in the (Table10)

Table 10: Sex distribution of the drug store sellers in each ward visited

Ward	Male	Female	Total
Kigogo	0	3	3
Kijitonyama	1	3	4
Mabibo	0	1	1
Magomeni	1	1	2
Msasani	1	3	4
Mwananyamala	1	1	2
Sinza	1	1	2
Ubungo	1	1	2
	6	14	20

Of the visited drug store sellers only 30% requested for prescriptions when a research assistant asked for treatment for his/her surrogate patients. Also only 40% asked about the age of the patient before dispensing the drugs and only 35% asked about the weight of the patient before dispensing anti-malarials. (Table 11).

Table 11: Percentage distribution of the drug store sellers who asked for prescriptions, weight and age of the patient before dispensing anti-malarials. (n=20)

Variable	Frequency	Percentage
Asked about prescriptions	6	30%
Asked about age	8	40%
Asked about weight	7	35%

Of the visited drug stores very few of the drug store sellers asked about the symptoms of malaria as follows; only 40% of them asked whether there is a rise of temperature, 25% asked about headache, 10% asked about vomiting and only 25% of them asked about convulsions. (Table 12).

Table 12: Percentage distribution of the visited drug store sellers who asked about the symptoms of malaria before dispensing anti-malarials. (n=20)

Variable	Frequency	Percentage
Asked whether there is a rise of temperature	8	40%
Asked about headache	5	25%
Asked about vomiting	2	10%
Asked about convulsions.	5	25%

Of the visited drug store sellers by simulated patients, the majority of them dispensed the following anti-malarials; SP 65%, Amodiaquine 35% and (Table 13).

Table 13: Percentage distribution of the dispensed anti-malarials by drug store sellers.

Anti-malarials	Frequency	Percentage
SP	13	65%
Amodiaquine	7	35%

The majority of the visited drug stores sellers (90%) issued instructions, on how to use the drugs, among them, only 55.6% of them gave clear instructions to the simulated customers, and about 44.4% of them the instructions were correct (Table 14).

Table 14: Percentage distribution of the drug stores sellers who gave instructions on how to use the drugs.

Variable	Frequency	Percentage
Issued instructions (n=20)	18	90%
Instructions clear (n=18)	10	55.6%
Instructions correct (n=18)	8	44.4%

When the simulated customer failed to purchase the suggested anti-malarial drug by a drug store seller about 10% of them were given an alternative drug. The reasons given to why they failed to purchase the drugs, about 78%% of them gave the reason that the actual drug is too expensive and only 22% of them gave the reason that, the actual drug is not available.

Of the visited drug store sellers only 10% of them advised their customers about side effects of the drugs they dispensed and none of them advised their customers about the danger signs of malaria if the treatment given is not effective.

CHAPTER 4

4.1 DISCUSSION

The selected drug stores had adequate representation in all 12 wards selected from Kinondoni Municipality. The age range of the drug store sellers was from 17 years, which was the youngest to 55 years, which was the oldest, and the mean age distribution of all drug store sellers was 25.8 years. In terms of sex distribution there were more females (90%) were found in the drug stores selling medication than males (10%).This can be explained from the fact that more than 70% of the drug store sellers interviewed were nurses in which majority of them are females. Of these studied drug store sellers only 28% of them were married.

Majority of the drug store sellers (75%) completed four years of Secondary education. In addition, over 70% had a medical background. Most were assistant nurses, followed by medical assistants and pharmaceutical technicians. With this level of education it is thus possible to carry out an education campaign for these drug store sellers on proper management of malaria.

The biological model of disease causation is commonly used in health education even though in many communities in Tanzania health and illness have alternative explanatory models. The effectiveness of any health education messages depends on the extend to which the gap between these models is narrowed. In this study mosquitoes were mentioned as the direct cause of malaria by over 90% of the drug store sellers, although when asked to give the specific types of mosquitoes that cause malaria, the majorities were not able to classify malaria transmitting mosquitoes.

This lack of knowledge about specific mosquitoes may be negative because this may lead to over diagnosis of malaria associated with mosquito density. Stagnant water, dirty environment and bushes around the houses were also mentioned as the cause of malaria by a few, these were mentioned by less than 20% of the drug store sellers. The low level of knowledge of these drug store sellers toward these important indirect factors in malaria transmission can also have a negative impact to the malaria control activities.

Regarding preventive measures of malaria, the use of insecticide treated nets (ITNs) was mentioned by more than 90% of the drug store sellers, this perhaps is due to the current advocacy of the national policy to the use of ITNs as a measure for malaria prevention. Other preventive measures mentioned by drug store sellers were as follows: weekly anti-malaria prophylaxis (15%), although this was mentioned by only a few, this is because the current national guidelines do not advocate weekly prophylaxis unlike in the past when chloroquine was given on a weekly basis to pregnant women.

Fever as a screening diagnostic test has a very high sensitivity especially during the peak malaria seasons. The global IMCI and WHO malaria policy, recommends fever as indicative of malaria (WHO, 1997). However, in this study only 64% of the drug store sellers mentioned fever as a primary symptom. The majority mentioned headache as an important symptom. Perhaps this could be because headache is a common general symptom in adults. Joint pains/muscle pain was also mentioned and these symptoms are also more common in adults. Thus the drug store sellers' knowledge about malaria symptomatology was insufficient. Children tend to have more vomiting, nausea and diarrhea but these drug store sellers did not adequately

mention these symptoms. Importantly fever or *Homa* in Swahili has multiple interpretations (Winch, *.et al.,* 1996). Any functional disorder is *Homa* and for malaria fever the symptoms explanation as raised in body temperature is important. Proper understanding of the common symptoms and signs by the drug store sellers is an important factor in malaria control activities. As shown by the results of this study ,the drug store sellers knowledge about common symptoms is limited and perhaps continued education package tailored for them is essential. Because of limited knowledge the practice is to over diagnose and therefore, over treatment with anti-malarials. This could have negative implication at three levels; the first one is unnecessary expenditures to the customers, secondly this will encourage spread of drug resistance (drug pressure is increased), lastly there is an increase of missed opportunity for correct treatment of other diseases than malaria.

SP is the first line Anti-malarial in the treatment of uncomplicated malaria in our Country. Tanzania has been using chloroquine as the first line of treatment of malaria for over forty years. However in the last two decades the malaria parasites have developed resistance to chloroquine by 52% (Premji, 1998). Among the factors that contributed to the development of chloroquine resistance are improper diagnosis and under dosage of the drug (Marero, 2000). When asked whether they knew which drugs are not effective in the treatment of malaria, over 90% of the drug store sellers mentioned Chloroquine, this shows that the majority of the drug stores sellers are aware of the existence of chloroquine resistance. Although there are still few of them who claim that chloroquine is still effective in the treatment of malaria and they still stock the drug and sell it to the customers at high price. This can be contributed to the negative public campaigns by media and other people to SP because of its

cutenous side effects to the people who are sensitive to it and failure of SP to rapidly reduce the fever as compared to chloroquine. Also few of them less than 2.5% mentioned SP as the drug, which is not effective in the treatment of malaria; this can also be contributed to the above reasons.

The knowledge on new recommended anti-malarial drugs by drug store sellers was found to be high in this study, since more than 90% of the interviewed drug store sellers mentioned SP and 81.9% of them mentioned Amodiaquine as the recommended anti-malarial drugs for the treatment of uncomplicated malaria. However, Quinine was also mentioned by over 40% of the drug store sellers and Artesunate by over 30% of them as the recommended drugs for the treatment of uncomplicated malaria. This implies that there is irrational use of Anti-malarial drugs that are only reserved for use in the treatment of complicated malaria.

Therefore, although the majority of them are aware of recommended drugs for the treatment of uncomplicated malaria, still there is indiscriminate use of Anti-malarial drugs which are reserved to treat complicated malaria.

The survey showed that the level of knowledge of the drug store sellers for SP and Amodiaquine dose for adults is acceptably high. Over 85% of them know the correct dosage of these drugs. However, the level of knowledge decreases dramatically when asked to mention the correct dosage of anti-malarials for children, since only 19.5% of them know the correct dosage of Amodiaquine while 67% know the recommended dose of SP for children. However, since children are more vulnerable to malaria, the finding of low levels of knowledge of anti-malarial drugs dosage to children implies that, a lot of children are under dosed or over dosed by these drug

store sellers and can lead to serious effects of toxicity and increased level of resistance of the malaria parasites.

The practice of selling anti-malarial drugs without prescriptions was found to be very high (80%) of the drug store sellers were selling anti-malarial drugs without prescriptions. This is in line with the National Malaria Treatment Guidelines, which allows anti-malarial drugs to be sold over the counter without prescriptions. The over the counter selling of anti-malarials is confined to the first and second line drugs (SP and AQ) only. However, as indicated by the results Quinine and Artesimine base compounds are also sold without prescription. This can lead to serious safety issues and therefore the need to put in place pharmaco-surveillance system. On the other hand, this unethical practice may be profit-driven. Given the high costs and lack of appropriate knowledge regarding symptoms and dosage, it is very likely that these drugs are grossly misused to the detriment of public health aspects of malaria.

More than 90% of the drug store sellers were able to mention the correct number of tablets of SP and Amodiaquine for the treatment of malaria for adults, but very few of them (less than 10%) were able to mention the required number of tablets of SP and Amodiaquine for children by age and weight, this shows that a lot of children are given improper dosage of anti-malarial drugs, even if the prescription from a doctor is correct.

Through the questionnaire study, information was obtained about symptoms, dosages etc,

An attempt was also made to substantiate these findings. This was done by using simulated patients, in which almost half of the visited drug store sellers issued instructions on how to use the dispensed anti-malarial drugs to the customers. Of

these only about 50% gave instructions that were correct and clear, hence this raises serious doubt whether the instructions given to the customers lead to the improper treatment and incorrect dosage of these anti-malarial drugs. This is important for SP, which has very serious muco-cuteneous reactions for those who are sensitive to it. Hence it is advisable to ask for the past history of sulphonamide sensitivity before dispensing SP so as to avoid this serious life threatening side effect. However, over 60% of the studied drug store sellers were not giving advice on the side effects of the drugs to the customers and this possibly is among one of the reasons of the exaggerated high incidences of the muco-cutenous reactions of SP to the community. When visited by simulated patients about 70% of the drug store sellers dispensed anti-malarial drugs without prescriptions and more than 50% of them did not ask the age of the patient and about 70% of them did not ask about the weight of the patient. This reflects that a lot of the patients are either under dosed or over dosed by these drug store sellers and this adds more weight to our previous findings from structured questionnaire. Therefore a lot of effort is needed to put on educating these drug store sellers to know the age and weight of a child before dispensing any drug to a child. The aim of such an education package should be to improve their practice. Also since less than 50% of the visited drug store sellers by simulated patients asked about the common symptoms of malaria like fever, headache, vomiting and joint pains, this shows that there is a lot of misuse of anti-malarial drugs since symptoms of the other diseases can be easily confused with the symptoms of malaria and hence patients are given anti-malarial drugs without being suffering from the disease.

CHAPTER 5

5.1 CONCLUSIONS

i. This study has shown that, despite of having good knowledge on the causes of malaria majority of the drug store sellers do not know other indirect causes of malaria like, stagnant water, dirty environment and clearing of the bushes around the houses.

ii. The drug store sellers' knowledge about malaria symptomatology was insufficient.

iii. The drug store sellers' knowledge about chloroquine resistance is adequate.

iv. The majority of the drug store sellers were knowledgeable on new recommended anti-malarial drugs but still there is irrational prescriptions of quinine and artesunate to treat uncomplicated malaria

v. The knowledge of adult dose of SP and amodiquine of children is extremely low.

vi. The majority of the drug store sellers are selling anti-malarials without prescriptions from health workers.

vii. Despite of the majority of the drug store sellers giving instructions to the customers, information given was still found to be not correct and clear to the majority of the customers.

viii. Information regarding side effects of the anti-malarials was not given by the majority of the drug store sellers.

5.2 RECOMMENDATIONS

The findings from this study suggests that, although the private and informal sector play a significant role in the management of malaria, still majority of the drug store sellers do not conform to the required regulations for malaria case management in the country. Hence the author suggest/recommend the following;

i. The drug store sellers should be given formal training on the proper treatment of malaria according to National malaria treatment guidelines.

ii. The private sector should be given a greater recognition by the government as the key partner in the fight against malaria, and an attempt should be made to integrate it into the national malaria control programme and improve the service they can offer.

iii. The national malaria treatment guidelines booklets should be made available to all drug store sellers.

iv. Health education to the general public on malaria treatment should be intensified.

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