Storage of antimalarials at household level and associated factors in Kiromo ward, Bagamoyo Tanzania

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Abstract

Background: Malaria is a highly debilitating and frequently fatal disease of wide distribution. Improper drug storage and rampant self-medication are some of the factors that may contribute to an increase in the development of drug resistance by malaria parasites towards antimalarials.

Objectives: To determine the extent of antimalarial drugs storage, sources and associated factors at household level at Kiromo ward in Bagamoyo, Coast region, Tanzania after the introduction of SP replacing chloroquine as first line.

Methods: A total of 300 households from three villages making up Kiromo ward were included in this study. Swahili version of the questionnaire and a checklist were used in data collection.

Results: Of the 300 households visited 25 (8.3%) were found to store antimalarials. The most commonly stored antimalarials were amodiaquine (30.8%) and quinine (34.6%). Most of these were in tablet form (76.9%). The source of these drugs was mostly from dispensaries. Kiromo was the only dispensary in the ward and others were outside the ward. These drugs were stored in special containers for safety. Frequent episodes of illness in the family were given as the most (56%) common reasons for drug storage in the families, followed by distance (20%). There was a statistically significant ($p<0.05$) association between storage of antimalarial drugs and number of children in the family and presence of a family member with febrile illness.

The study further showed that out of 26 different types of antimalarials stored, only 7 (26.9%) had expiry dates on the containers because these were original containers of the drugs.

Conclusion: The study revealed that few households store antimalarial drugs with amodiaquine and quinine being the most stored. The majority of the households obtained antimalarial drugs from dispensaries. Health education should be given not only to the patients but also the entire general public on the appropriate drug use, safety, expiry dates and appropriate storage. A model dispensary like Kiromo should be implemented in other rural areas.

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Introduction

Malaria is a highly debilitating and frequently fatal disease of wide distribution. Most deaths due to malaria occur in Sub-Saharan Africa, and most children under five are at highest risk. In Tanzanian malaria is number one cause of morbidity and mortality. Before the year 2000, uncomplicated malaria was treated with chloroquine (CQ) as the first line drug and quinine (QN) as the second line drug in (NEDLIT, APRIL 1997). The government has therefore since 2001 recommended the first line drug for the treatment of uncomplicated malaria to be sulphadoxine-pyrimethamine (SP), second line treatment is amodiaquine (AMDQ) and the third line treatment is quinine tablets. Artemisinin (ART) derivatives and halofantrine are also used in treatment of malaria in Tanzania.

The resistance of Plasmodium to antimalarial drugs such as CQ, QN and SP has increased the malaria burden. The storage of drugs at home promotes self-medication, which may result in inadequate dosage administration, thus predisposing to incidences of drug resistance.

Other factors, which could contribute to development of drug resistance are lack of proper instruction on drug usage, irrational prescribing of drugs by both unqualified and qualified personnel and tendency of some people sharing drugs with other members of family or neighbors resulting in incomplete dosage.

In Tanzanian private pharmacies, drug stores and ordinary shops dispense antimalarials over the counter without prescription. It is doubtful if they give appropriate dose, meaning that patients either do not take a required course or might even be overdosed resulting in unwanted toxic effects.

Home stocked drugs may lose potency due to poor storage, as a result of exposure to heat, light, humidity and air. It is difficulty to tell a drug has expired if the expiry dates are missing in most of the drug containers. Expired drugs pose toxicity risk as in some cases allow the active substance to undergo degradation leading to formation of toxic products. The administration of such drugs may lead to unsuccessful treatment of malaria and onset of complications such as cerebral ma-

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laria and anemia as a result of delayed appropriate treatment.

Improper drug storage and rampant self-medication are some of the factors that may contribute to an increase in the development of drug resistance by malaria parasites towards antimalarials. Self-medication especially with antimalarial drugs has been reported in various parts of Africa. In Harare Zimbabwe, self-medication was reported to be common in up to 95% of the households and among them; the most common drugs found in the families were antimalarials (Kasilo et al 1991). A study done in Kenya rural area on self-medication of antimalarials found out that self-medication was extremely common. Sixty percent of 138 episodes of febrile illness were treated at home using medicine purchased at local shops (Ruebush et al 1995). On the other hand, a study done in Dar es Salaam, Tanzania to assess the extent of self-medication with antimalarials found out that as higher as 71.7% of the interviewed individuals was reported having treated them for a suspected malaria fever (Mnyika et al 1995).

Drug storage at home promotes self-medication and could lead to exposure to factors that accelerates deterioration of drug quality. This behavior may also delay getting proper treatment when there is misdiagnosis. The common symptom of malaria is fever, hence most people will take drugs that will bring fever down first and if symptoms persist then antimalarials are taken. This sometimes can be fatal especially when antipyretic drugs masked underlying disease in children (Eskerud et al 1991). Another study conducted by Mbatiya (1996) in Kibaha found that 32.6% of respondents agreed that they stored antimalarials at home. On the other hand, the availability of antimalarials in places other than the health facilities like retail pharmacies, drug stores and ordinary shops where over the counter dispensing is practiced have emerged contributing to the factors that promote home drug storage. A study conducted by Kasilo et al (1991) in Zimbabwe showed that the sources of home stored antimalarials were pharmacies, shops, hospitals and friends or relatives. A similar study done in Kenya revealed that 60% of the people interviewed purchased their antimalarials from the ordinary shops and pharmacies, while only 18% received treatment at the health facilities (Ruebush et al 1995).

Findings of the study done in Dar es Salaam (Mnyika et al 1995) showed that among those who were found storing antimalarials at home, 72.7% bought the drugs from private pharmacies or shops, while 80% of those who stored the drugs (Mbatiya et al) obtained them from drug stores, 6.4% got them from public health facilities and 3.2% from other sources like friends or relatives. Temu (2002) indicated that the sources of drugs stored at home were from pharmacies (35.2%), private and hospitals/dispensaries (19.3%), relatives and friends (8.5%) and ordinary shops (5.3%).

A study done in Amana district hospital in Dar es Salaam on drugs given to children under five years at home found that mothers/caretakers mostly used chloroquine (83.3%) and paracetamol (91.5%) at home. This study revealed that retail pharmacies were the major drug resource for home treatment (47.3%) followed by nearby shops (21.5%) and medical stores (17.2%) (Temu et al 2001).

This study aims to determine the extent of antimalarial drugs storage, sources and associated factors at household level at Kiromo ward in Bagamoyo, Coast region, Tanzania after the introduction of SP replacing chloroquine as first line. Other drug utilization parameters such as size of household, number of children in a household, occurrence of febrile illness, and distance of source of drug as determinants of storage of antimalarials in the home

Methods

Study design and target population

A descriptive cross sectional study, conducted at Kiromo ward, one of the eight wards of Bagamoyo district from September 2003 to June 2004. Kiromo ward has three villages with a population of 6011 people of whom 2957 are males and 3054 females.,. All the three villages were studied. Ten-cell units (from each village were selected by simple randomazation techniques where by all ten-cell units had equal chance of being incluled; all households within the selected Ten-cell units were included in the study. A total of 30 ten-cell units, 10 from each of the three villages

Data collection and analysis

Households from selected ten-cell units were visited and face-to-face interviews were conducted at household through the head of household or any adult capable of delivering required information using mostly closed ended questionnaires.

Questionnaires were assigned serial number, and the variables to be measured were coded. Data entry, cleaning process and statistical analysis and results reported as Chi-square were achieved using statistical Epi Info 6 (version 6.04) software.

Ethical consideration

Permission to conduct this study was obtained from relevant authorities that are district, ward, villages and Ten-

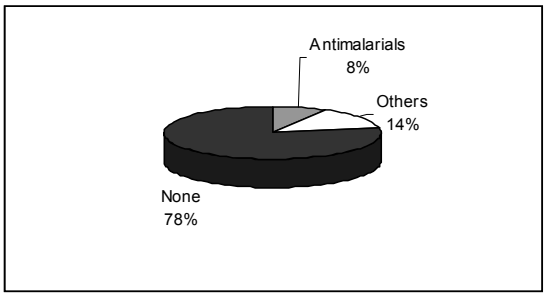
cell units in the respective areas. Consent was sought from the selected community members before carrying out the interviews. Privacy was maintained during the entire period of interviews.

Results

Table 1 presents the demographic characteristics of the respondents. Most of the interviewees were between the age of 21 and 60 years, with a ratio of male to female of approximately 1:1.

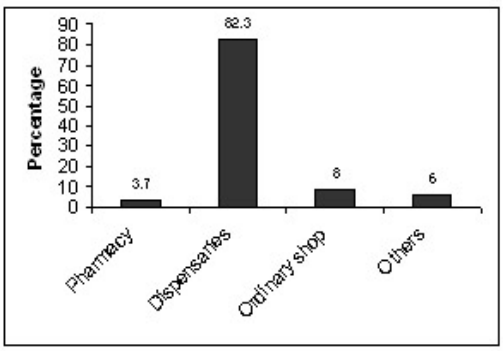
Majority of the households (78%) do not store drugs at home as shown in figure 1.

Figure 1. The extent of antimalarial storage at household in Kiromo ward.



Only about 8% of the households stored antimalarials at home, while 14% were storing other drugs. Most of the households stored analgesics (37.8%) followed by antibiotics (28.6%) while antimalarials account for 21.8% of all drugs stored. The numbers of households with respect to the common sources where the household members obtain their drugs appear in figure 2.

Figure 2. Source of drugs stored at the Households



Generally dispensaries were the leading sources of drugs (82.3%). On the other hand, pharmacies were the least source of drugs in this area (3.7%). Other sources such ordinary shops; relatives and friends also represented a small percentage (6-8%) over the rest of the sources of drugs.

Table 1. Demographic characteristics of the study population (n=300)

	Sex		
Years	**Male**	**Female**	**Total**
≤ 20	10 (6.5%)	5 (3.4%)	15 (5.0%)
21 –30	49 (31.8%)	30 (20.5%)	79 (26.5%)
31 –40	38 (24.7%)	38 (26.0%)	76 (25.3%)
41-50	26 (16.9%)	35 (24.0%)	61 (20.3%)
51 –60	26 (16.9%)	21 (14.4%)	47 (15.7%)
61<	5 (3.2%)	17 (11.6%)	22 (7.3%)
Total	154 (100%)	46 (100%)	300 (100%)

Table 2 shows the correlation between frequencies of storing antimalarial drugs and the number of people living in the same house. For instance, the household with 5-8 people was found to store more antimalarial drugs than those families with less than 5 people. On the other hand, households with more than 8 people were found to store drugs to a lesser extent.

Table 2 .The antimalarial drugs storage in relation to the number of people in the household.

Number of people in the house hold	**Antimalarial drug storage**		**Total**
	Stores	**Do not store**	
1 –4	4 (3.7%)	105 (96.3%)	109 (100%)
5 – 8	19 (11.3%)	149 (88.7%)	168 (100%)
≥ 9	2 (8.7%)	21 (91.3%)	23 (100%)
Total	25 (8.3%)	275 (91.7%)	300 (100%)

However, according to Chi-square test this relationship was statistically insignificant ($p > 0.05$). With regards to association between antimalarial drug storage and the number of children living in household, the results showed that the proportion of households storing antimalarials increased with an increase in the number of children living in the house. This relationship is statistically significant according to the Chi-square test ($p < 0.05$).

The results show the distribution of households in relation to the use of different antimalarial drugs in the treatment of malaria. Among the households interviewed 60.7% reported to have used SP for treating malaria, whereas a small percentage (3.7%) was still using chloroquine. Interestingly, about 22% of those interviewed indicated that they did not know drugs, which were used to treat malaria.

The majority of the households (about 60%) stored SP. About 20% of the respondents did not know the antimalarial drugs they stored, while a small

percentage (about 4%) stored chloroquine at home.

Among the different formulations of antimalarial drugs stored, the study found 76.9% were in tablet form while there were no injectable.

With respect to different places where antimalarials are stored in the households, it was revealed that drugs were mostly stored in special containers (40%) and cupboards (32%). Only a small percentage (4%) of households stored their antimalarials in open spaces such as on the table

The relationship between the episodes of febrile illnesses for the past one month and storage of antimalarials in the households was also investigated. There were twice as many households that had experienced febrile episodes among the households found to store antimalarials. This relationship was statistically significant ($p < 0.05$).

The influence of the distance between the household and the source of drugs on the storage of drugs in the households was investigated with 25 households found to store antimalarials 15 are with in 0-4 Km from the source. The relationship is statistically insignificant ($p>0.05$).

Different reasons for storing antimalarial drugs in the households are were reported. Frequent episodes of illness were given as the main reason (56%) for storage of antimalarials. Distance from the source of antimalarial drugs had an insignificant influence on storage of antimalarials in the households. Those who stayed far away from the source had less tendencies of storing antimalarials drugs in their homes than those who stayed much closer to the source.

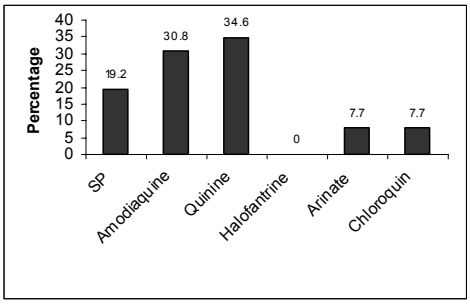
Table 3 shows presence or absence of expiry dates, Dose and drug names on the containers in which antimalarials were kept in the households. One house was found to have two types of antimalarial drugs. All drug containers had name written on them while 80.8% had only dosage indication. Only a few containers (7%) had the expiry dates of the drugs indicated.

Table 3 . Households storing antimalarials based on labels on antimalarial containers.

Types of label	Yes	No	Total
Expiry date	7 (26.9%)	19 (73.1%)	26 (100%)
Dose	21 (80.8%)	5 (19.2%)	26 (100%)
Drug name	26 (100%)	0 (0%)	26 (100%)

Figure 3 below represents the different antimalarial drugs that were found to be stored in the households; amodiaquine (30.8%) and quinine (34.6%)

Figure 3. Distribution of antimalarial drugs stored at home



Discussion

The study involved a total of 300 households from Mataya, Buma and Kiromo villages making up Kiromo ward. In a total of 300 interviewees who responded to the questions (51.3%) were male and (48.7%) were female; the ratio of male to female interviewed was about 1:1.

It was found out that 8.3% of household stored antimalarial drugs, 14% stored other drugs while 78% did not store any drug. Analgesics (37.8%) were the leading household stored drugs followed by antibiotics (28.6%) while others constituted 11.8 %. This differs significantly from the study done in Dar es Salaam by Mnyika et al (1995), where as much as 71.7% of households were reported to have been storing antimalarials in their homes. Also in a study done by Mbatiya (1996) in Kibaha, it was shown that 32.6% of households stored antimalarials. This difference in findings may be attributed to the fact that Mnyika and Mbatiya did the studies in urban areas while this study was done in rural area. This would mean that people living in urban areas have much more access to the drug sources, purchasing power and education level is high than those residing in rural areas. To a lesser extent policy change from CQ as first line drug for malaria treatment (since August 2001) to SP could have played a role in the observed difference. The later being a single dose and expensive, hence reducing the probability of storage at home in comparison to the former. In the households that were interviewed 60% use SP for treating malaria. It was interesting to note that amodiaquine (30.8%) and quinine (34.6%) were the most stored antimalarial drugs, while SP accounted only 19.2% despite being mentioned as the leading (60.7%) drug of choice in the treatment of malaria. This can partly be explained by the fact that SP is

taken as a single dose and as a result it has higher chances of good compliance. On the other hand, amodiaquine is taken for three days while quinine is taken for seven to ten days, thus creating a room for not finishing the treatment course; as a result drugs are remaining and be stored at home.

Further, it was found that 48% of the people in the households are aware of the expiry date and responded that they will store and use drugs before their expiry. It was established that only 26.9% of the drug containers had expiry date on them. This is not really promising since a large number of people who are aware of the expiring of drugs have no chance of knowing the date of expiry of the drugs they are using. The presence of few drug containers with expiry dates on them can be explained by the fact that the drugs being dispensed are not in their original packaging as no dispensers bother to document the expiry dates of the original container on the new package used for dispensing the drugs. On the other hand the knowledge of dispenser towards expiry date could be another explanation. Nevertheless, even if the expiry dates will be known for certainty, drugs, which are stored at home for a long time, are likely to deteriorate even before their official expiry dates due to unconducive storage conditions in the houses.

The source of antimalarial drugs for the households was established to be the dispensaries (72%), ordinary shops (12%) and medical stores (8%). These results contrast significantly with the findings reported earlier by Ruebush et al, 1995. (Chi-square 3.9 $p < 0.05$) where majority of drugs were sourced from ordinary shops. Kiromo dispensary under Neema project was established and run by ADUPS and IPFSA. The dispensary caters health services for the three villages in the study area. It was interesting to see that a large proportion of the population gets their drugs from Kiromo dispensary as the other dispensaries are outside Kiromo. These results contrast with the study done by Mnyika et al (1995), which found out that 72.7% of the respondents bought drugs from private pharmacies or shops. Another study done in Amana district hospital by Temu et al (2001) found out that 47.3% of respondents got drugs from pharmacies. The big contrast between this study and the two studies by Mnyika and Temu can be attributed to the geographical setting of the study areas i.e. this study was done in a rural setting where there are no pharmacies and medical stores, which are plenty in the urban area where the two studies were conducted.

Having frequent illness as a reason for storing of antimalarial drugs was found to account for 56% of respondents who stores antimalarial at household. Other reasons were distance from the source and number of children in the household that accounted 20% and 16%, respectively. There was an increase in proportion of households storing antimalarial drugs from 2.4% for those who had no children to 16.3% for those with more than four children. The association was statistically significant with chi-square = 6.11 and $p < 0.05$. The explanation for this observation is based on the fact that malaria affects mostly children and hence families with more children in their houses are more likely to store drugs in their houses than those families with no/or a few number of children. In addition, fever in children is in most cases considered as a symptom of malaria and therefore children having frequent fevers are mostly treated with antimalarials in the households. Unfortunately, this self-medication is one of the causes of increasing drug resistance towards antimalarials.

The study also showed an association between storage of antimalarial drugs and presence of febrile illness in the past one-month. The proportion of households storing antimalarial drugs increased from 5.8% for those who had no febrile illness to 12.8% in those households, which had an episode of febrile illness. The relation was statistically significant by chi-square test with $p < 0.05$. This difference is due to the fact that families, which had experienced an episode of febrile illness, will tend to equip themselves with antimalarials at home with an anticipation of such another episode re-appearing. The study noted that the households visited were happy with Kiromo dispensary because it was easily accessible, drugs were available and affordable at low prices compared to pharmacies and drug stores. Thus, a well-equipped dispensary like Kiromo where the study was done will be a good example as a source of medicines in any rural area health facility setting.

Conclusion

The study revealed that few households store antimalarial drugs with amodiaquine and quinine being the most stored. The most commonly used antimalarial drug was SP. The majority of the households obtained antimalarial drugs from dispensaries. Most antimalarials stored were tablets and they stored them in a special containers made for storing drugs for safety. The major factor for storing drugs is the episodes of febrile illness, although distance from the source shows to play a role. Other drugs which were stored at home including analgesics and antibiotics. Dispensaries like Kiromo should be taken as a good example for other dispensaries where accessibility, availability and affordability of drugs is paramount. For Good Pharmacy Practice, dispersers should be advised to include on the label the name of the patient and drug,

dose, expiry date and storage conditions to all dispensed containers. Also emphasize during dispensing to patients, the importance of appropriate drug storage at home, safety and proper use. Dispensaries should be of high standards in health care services and be maintained for the benefit of the patients especially those in the rural areas such as Kiromo dispensary.

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