

**Research Article**

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## Evaluation of malaria spread in relation to poor environmental conditions at Kibaha district (Tanzania)

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**Abstract**

Communicable diseases cause a lot of out-patient attendance resulting to huge allocation of funds by both Governmental and Non – governmental organizations in combating them. A cross section study was conducted at Maili Moja community to ascertain environmental conditions prevailing in the area and how they contribute to the spread of Malaria as a communicable disease. About 200 questionnaires were self - administered to the community to capture data. The study reviewed that not using treated mosquito nets accounted for 81.2% of chances of suffering from malaria. Malaria is the main causes of communicable disease burden in Maili Moja community. It was found that poverty, neglecting the use of Long Lasting Insecticide Treated Nets (LLITNs), treated bed sheets and indoor residual Spraying (IRS) also poor environmental conditions untreated compost pits, stagnant water and sewages lead to the spread of malaria disease. It is therefore recommended that Maili Moja community to use Long Lasting Insecticide Treated Nets (LLITNs), bed sheets, perform routinely spray of mosquito insecticides, treatment of drinking, sewage and stagnant water be intensified in the community. It is also recommended that water and sanitation be improved by putting up new water points and sanitary facilities.

**Keywords:** Communicable diseases, Malaria, Insecticide Treated Nets, Sanitation.

**INTRODUCTION**

A communicable disease is a disease that spreads from person to person and the spread can easily be facilitated by poor environmental conditions <sup>[1]</sup>. Tanzania development vision 2025, identifies health as one of the priority sectors. Among its main objectives, is achievement of high quality of life for all Tanzanians, and this is expected to be attained through access to quality primary health care for all <sup>[2]</sup>. In most complex emergencies, communicable diseases alone, or more commonly in combination with malnutrition, are the major cause of illness and death in the developing countries <sup>[3]</sup>. The main causes of morbidity and mortality are diarrhoeal disease - including cholera and dysentery - acute respiratory infection, measles, and malaria, with HIV/AIDS and tuberculosis becoming increasingly important <sup>[4, 5]</sup>. Communicable diseases are caused by poor environmental conditions such as; unsafe water supplies, poor personal hygiene, poor sanitary facilities, poor living standards and unhygienic food <sup>[5]</sup>. This is the supply of unwholesome water for human consumption. This can be done through supplying polluted water and increased distance to water sources. Supply of unsafe water leads to water borne diseases, e.g., Diarrhoea and scabies <sup>[6, 7]</sup>. Poor personal hygiene may lead to water borne diseases, this can be facilitated by irregular bathing, not washing hands after using the toilets, wearing dirty clothes and keeping long nails <sup>[6, 8]</sup>. Sanitation is the hygienic means of promoting health through prevention of human contact with hazards of wastes. Good sanitation can be acquired through good exceta disposal and good refuse disposal. Poor sanitation may result to communicable diseases such as diarrhea diseases – Salmonellosis, Typhoid, Dysentery, Cholera etc. Worm infestations – intestinal and skin worm infection, infectious skin diseases <sup>[9]</sup>. Good living standard may be provided through having balanced diets. Living in a well ventilated and spacious house and adequate availability of social amenities <sup>[10, 11]</sup>. Lack of the above facilitates the spread of communicable diseases e.g., TB, malnutrition, scabies and high level of illiteracy resulting in ill health of the family members <sup>[5, 9, 12, 13]</sup>. Unfavorable environmental conditions can facilitate disease transmission through various ways; the breeding of disease vectors e.g. mosquitoes can highly be influenced by high temperature and water logged areas <sup>[12, 14]</sup>. Flood after heavy rains can result in sewage overflow and water contamination. A lot of pathogens spread from one place to another by wind and water <sup>[15, 16]</sup>.

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## Malaria

Malaria is a leading public health problem in Tanzania mainland, contributing to 39.4% of total OPD (outpatient department) attendance. It is the leading cause of death in children under five, contributing to 36% of deaths in this age group [8, 17]. Zanzibar has shown a marked decline in malaria incidence since the scaling up of multiple interventions, including the introduction of Long Lasting Insecticide Treated Nets (LLITN) to vulnerable groups and the deployment of indoor residual Spraying (IRS). Hence in Zanzibar, malaria is no longer the number one cause of child mortality [10, 18, 19]. Disease reporting in Tanzania has improved steadily and the ministry of health is now reporting weekly by its 114 districts and continuous to report monthly as well [20]. Disease surveillance, reporting and responding to outbreaks is also solid. WHO and the Ministry of Health, work in coordination and an efficient manner towards controlling and preventing outbreak e.g., outbreak investigations and supply of drugs [8, 21]. Other teams work in close collaboration in sharing data, supply transport, assignments such as in the training where appropriate [10, 16, 18, 22]. Despite double effect by both government and NGOs in improving environmental conditions in order to reduce the spread of communicable diseases [19, 23], there has never been an assessment on how the poor environmental conditions contribute to the spread of communicable diseases in Maili Moja community. The government and NGOs have been implementing sanitation and water programmes in Maili Moja community and malaria disease is not decreasing [2, 24]. There is no information showing the level of environmental sanitation in the community [2]. This study was aimed to evaluate malaria as a communicable disease in relation to poor environmental hygienic standards in Kibaha – Maili Moja community. It provides evidence based relationship between environmental conditions and the spread of malaria diseases. The research rates environmental conditions and provides information on which condition most needs attention to reduce the spread of malaria diseases.

## MATERIALS AND METHODS

### Study area

Kibaha District is one of the six districts of the Coast Region and is located 40 km west of Dar Es Salaam, along the Dar Es Salaam - Morogoro Highway. The district lies between latitude 6.8° in the South and longitude 38.2° and 38.5° in the East. Kibaha District shares common borders with Bagamoyo District in the North, with Bagamoyo District again and Morogoro Rural District in the West and with Kisarawe District in the South. The District consists of 5 administrative wards: Magindu, Kwala, Soga, Mlandizi and Ruvu.

### Mlandizi wards and Maili Moja area.

The study was carried out in the Maili Moja community, Mlandizi administrative wards. The ward borders kwala wards to the west and Bagamoyo district to the north, Maili Moja lie between latitudes 6.42° and 7.03° in the South and longitudes 38.17° and 38.38° in the East (Figure 1). Maili Moja area was chosen because there was an increase in cases concerning communicable diseases mainly Malaria, Diarrhoea and Typhoid diseases [20].

### Materials

The materials used included; Realm of papers, pencils, pens, cartridge tonner, printer and computer

## Sampling technique

Simple random sampling was used to come up with 200 household where, questionnaires were administered on. The formula below was used to calculate the sample size [25].

$$N = \frac{T^2 \times P(1-P)}{M^2}$$

N = required sample size

T= confidence level at 95% (Standard value of 1.96)

P= estimated prevalence of malnutrition in the project area

M= margin of error at 5% (Standard value of 0.05)

## Questionnaire administration

About 200 questionnaires were administered to 200 households through random selection. Questionnaires were administered by direct interview of the respondent.

## Data analysis

Data was analyzed using Microsoft Excel Software and EPI info [26, 27].

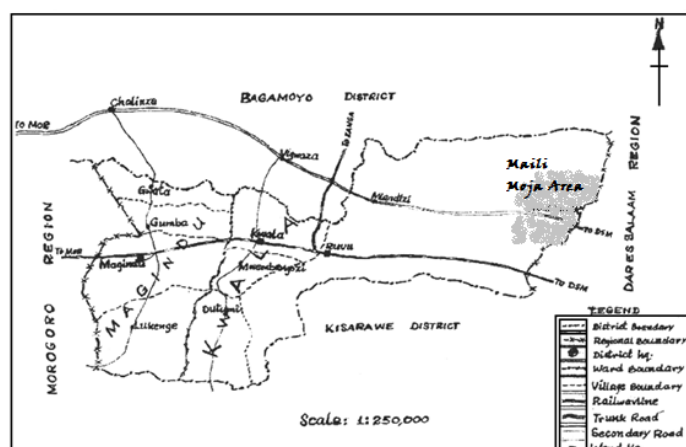
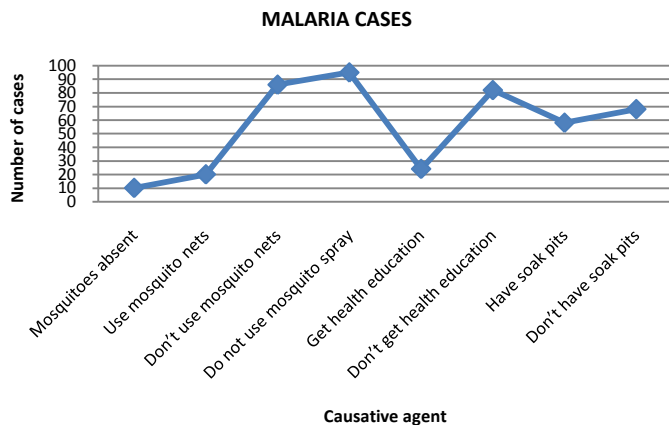


Figure 1: Map of Kibaha wards

## RESULTS

### Malaria

From figure 2, we can see that there are three major factors that contribute to the spread of malaria in Maili Moja community. The presence of mosquitoes, accounted for 95 out of 106 recorded cases of malaria, which represented 89.6% of those who suffered from malaria. Some community members claimed that there were no mosquitoes around their environment, accounted for 10 out of 106 recorded cases of malaria, which represented 9.4% of those who suffered from malaria. Out of the 106 questionnaires it was found that only 20 villagers use mosquito nets which accounts for 18.9% while 86 were not using mosquito nets which accounted for 81.1%. 89.6% of the villagers do not use insecticides to control mosquitoes, this was presented by 95 out of the 106 cases presented. 77.4% of the villagers have never got or gone for health education concerning Malaria and its control only 22.6% have accessed to information and education concerning malaria and its control, this is presented by 82 and 24 cases accordingly in figure 2. 58 of the cases claimed to have soak pits while 68 had no soak pits this represented 54.7% and 64.2% of the population in the community.



**Figure 2:** Causative agents for malaria against number of recorded cases

## DISCUSSION

### Causes and solutions of Malaria disease in Maili Moja community

This study was conducted in a town outcast setting of Maili Moja ward, which is endemic to malaria and other communicable diseases. The majority of respondents were illiterate with over 60% of respondents had not been subjected to health education, indicating a high prevalence of abject poverty in the study area. Malaria can only be spread by bite from a female anopheles mosquito infected by malaria parasite. Therefore the higher mosquitoes infestation in the house, the greater the chances of finding the anopheles mosquito which causes malaria. The most identified factors were not using insecticides to control mosquitoes, not using mosquito nets, lack of health education and absences of soak pits. These were presented by 89.6%, 81.1%, 77.4% and 64.2% respectively of the 106 cases presented as per the collected questionnaires. Due to the presence of mosquitoes, the main identified cause of the spread of malaria was not using treated mosquito nets and bed sheets, this may be due to non – availability of treated mosquito nets, some myths that prevent the community from using them, inadequate health education and poverty which reins in most of villagers and generally in developing countries. Lack of proper compost, disposal pits, bushes stagnant water and sewages are other causes, they provide breeding ground for mosquitoes as malaria vectors.

A similar study was conducted in a rural setting of Sarpang district in Bhutan, which is endemic to malaria and other vector-borne diseases, where majority of respondents were farmers and illiterate [28]. It was found that LLIN was the most effective means of malaria prevention and control [29, 24]. Which was distributed regularly according to family size with the objective to achieve universal coverage. And there was a need to monitor the net availability at households regularly and distribute accordingly. Further, communities lacked specific knowledge on net care, such as frequency of washing and drying as revealed during pre-intervention [28]. It was found that people didn't sleep under nets because of supply and poverty that made them not to meet such practices [29]. IRS is a very effective tool for malaria prevention and Bhutan has used IRS since the inception of the malaria control initiatives in 1961, and is currently used in the community in combination with LLINs [30].

Health education made many Bhutan respondents to knowing the causes of malaria, their symptoms and seeking health facility as the first line of

treatment for malaria. This was due to better health care delivery systems through the public health services and size of the population [3, 26].

For control of malaria in Maili moja community it was recommended that the villagers should adopt spray of insecticides to the environment and house hold, use Long Lasting Insecticide Treated Nets (LLITNs) and treated bed sheets, perform indoor residual Spraying (IRS), dig composit pits for disposal of waste materials, due to poor environmental conditions they should treat compost pits, stagnant water and sewages, increase sanitation by clearing breeding zones like bushes and putting up new water points and sanitary facilities to reduce the breeding of mosquitoes. The government and NGOs are urged to provide adequate facilities and health education concerning Malaria and other communicable diseases on how to prevent and control their spread.

## CONCLUSION

This study showed that by providing health education, communities can improve on prevention and control of malaria. This interventional study was successful in enabling communities to learn, take initiatives and participate in malaria prevention and control in their locality and hence has potential and scope for expansion into other malaria-endemic areas of Tanzania and can be utilized as the gateway for community development at the lowest administrative level by various sectors and agencies in developing the community. The methodology applied here can be utilized for the same purpose with other diseases, such as improving knowledge, awareness and assessing on other communicable diseases HIV/AIDS, tuberculosis and strategizing a therapy programme in the community, promoting community referral systems, and in improving the sanitation and hygiene of the community. From data analysis of our study it proves that poor environmental conditions, lack of health education, poverty and myths have lead to increase and spread of communicable diseases thus intervention by organization boards and government will help by providing health educations sanitary facilities and clean environment that will lead to a better and healthy society.

## Recommendations

Provide Health Education to the community members about the importance of using LLITNs and treated bed sheets, performing IRS and importance of keeping the kitchen clean. Create a clean environment by clearing bushes, placing new and clean water points, latrines, flash toilets and compost sites. Treatment of water points, drainage and treatment of stagnant water and sewages.

## Challenges and limitations

The researcher experienced minimal cooperation from the villagers. There were difficulties in obtaining accurate data due to high level of illiteracy as villagers had different understanding on the concept in the questionnaires. No lab samples were collected and examined to ascertain whether the highlighted caused were truly causes of the diseases under the discussion.

The study period was rather short with only about six months gap after the intervention started until evaluation through the post-intervention survey. Therefore, the time duration was rather short to assess all the community members and their response towards malaria as a communicable disease.

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## REFERENCES

1. Brown R E, Miller B, Taylor W. Health-care expenditures for communicable diseases in the United States. *Arch Intern Med*; 2013;155(5):1595-1600.
2. National Environmental research agenda for Tanzania. 3rd ed. NEMA, Inc: Tz, 2014.
3. Paquet C and Hanquet G, Control of infectious diseases in displaced populations in developing countries. *Int J Epidemiol* 2012; 9(6): 10-14.
4. Connolly MA, Heymann DL. Deadly comrades: war and infectious diseases. *Lancet*. 2002 Dec;360 Suppl:s23-4.
5. Gessner B D, Mortality rates, causes of death, and health status among displaced and mortal populations in developing countries. *J. Comm. Dis.*, 2012;27(2): 82-85.
6. Spiegel P, Sheik M, Gotway-Crawford C, Salama P, Health programmes and policies associated with decreased mortality in displaced people in postemergency phase camps: a retrospective study. *Int J Epidemiol* 2014;12(2):27-34.
7. World Health Organisation, World Malaria Report; Geneva WHO, CDR/GPV/15.2, 2015.
8. WHO, Prevention and control of malaria epidemics. 3rd meeting of the Technical Support Network. Geneva: WHO, 2012.
9. Centers for Disease Control and Prevention, Estimates of foodborne illness in the United States. Available via the Internet: <http://www.cdc.gov/foodborneburden/index.html>, (Derived in Aug 2015)
10. Rowland M, Durrani N, Hewitt S, Permethrin-treated chaddars and top-sheets. Appropriate technology for protection against malaria in Tanzania and other complex emergencies. *J Trop Hyg*, 2013; 93(4):65-72.
11. World Health Organization, Guidelines for epidemic preparedness and response to measles outbreaks. Geneva: WHO, WHO/CDS/CSR/ISR/12.1. 2012.
12. American Public Health Association, Control of communicable diseases manual. 17th ed. James Chin, ed. Washington DC: American Public Health Association, 2013.
13. United States Department of Health and Human Services, Healthy People 2020 Objectives. Available via the Internet: <http://www.healthypeople.gov/2020/topics/objectives/2020/default.aspx>. (Retrieved in July 2015).
14. English P B, Sinclair A H, Ross Z, Anderson H, Boothe V, Davis C, Ebi K, Kagey B, Malecki K, Shultz R, Simms E, Environmental health indicators of climate change for the United States: findings from the State Environmental Health Indicator Collaborative. *J. Environ Health* 2014;117(11): 73- 81.
15. Roberts L, Chartier Y, Chartier O, Malenga G, Toole M, Rodka H, Keeping clean water clean in a Dar es salaam randomized intervention trial. *J. World Health Organ*, 2015;79(2):80-87.
16. Sobsey M D, Handzel T, Venczel L, Chlorination and safe storage of household drinking water in developing countries to reduce waterborne disease. *J. Water Sci Technol*, 2013;47(2):221-28.
17. Graves P M, Brabin B J, Charlwood J D, Reduction in incidence and prevalence of Plasmodium falciparum in under-5-year-old children by permethrin impregnation of mosquito nets. *J. Comm. Dis.*, 2014;65(8): 69-77.
18. Alonso P L, Lindsay S W, Schellenberg J R, A malaria control trial using insecticide-treated bed nets and targeted chemoprophylaxis in Zanzibar, Tanzania .The impact of the interventions on mortality and morbidity from malaria. *Afr. J. Med Hyg*. 2014;7(2): 37-44.
19. Macintyre K, Sosler S, Letipila F, A new tool for malaria prevention?: results of a trial of permethrin-impregnated bedsheets (shukas) in an area of unstable transmission. *Int J Epidemiol*, 2013;32(1):57-60.
20. Ministry of Health, Malaria Survey in Sub Sahara Africa 12th ed. WHO, Inc.: Geneva, 2015.
21. Graham K, Mohammad N, Rehman H, Insecticide-treated plastic tarpaulins for control of malaria vectors. *J. Med Vet. Entomol*, 2015;16(2):44-48.
22. Ministry of Health, Insecticide Guidelines for IRS in Tanzania, 7th ed. WHO, Inc.: Geneva, Switz, 2015.
23. Alonso P L, Lindsay S W, Armstrong J R, The effect of insecticide-treated bed nets on mortality of Tanzanian children. *J. Mal. Res.*, 2013;33(7):499-502.
24. World Health Organisation, World Malaria Report; Geneva WHO, CDR/GPV/14, 2014.
25. Panter-Brick C, Clarke S E, Lomas H, Pinder M, Lindsay S W, Culturally compelling strategies for behaviour change: A social ecology model and case study in malaria prevention. *J. Soc Sci Med*, 2012;6(2):2810-25.
26. Brieger W R, Health education to promote community involvement in the control of tropical diseases. *Acta J. Trop Dis*, 2010;61(2):93-106.
27. Salama P, Assefa F, Talley L, Malnutrition, measles, mortality and the humanitarian response during a famine in East Africa. *JAMA*, 2012;28(2):63-71.
28. Nonaka D, Laimanivong S, Kobayashi J, Chindavonsa K, Kano S, Vanisaveth V, Yasuoka J, Phompida S, Jimba M, Is staying overnight in a farming hut a risk factor for malaria infection in a setting with insecticide-treated bed nets in rural Laos? *Malar J*, 2014;9(9):372.
29. Mutuku F M, King C H, Mungai P, Mbogo C, Mwangangi J, Muchiri E M, Walker E D, Kitron U, Impact of insecticide-treated bed nets on malaria transmission indices on the south coast of Kenya. *Malar J*, 2014;10(2):356.
30. Okumu F, Moore S, Combining indoor residual spraying and insecticide-treated nets for malaria control in Africa: a review of possible outcomes and an outline of suggestions for the future. *Malar J*, 2015;10(2): 208.