THE INFLUENCE OF INFRASTRUCTURAL SUPPORT AND POPULATION MOBILITY FACTORS ON STRATEGIC CONTROL OF MALARIA IN HOMABAY TOWN CONSTITUENCY, HOMABAY COUNTY, KENYA

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ABSTRACT

Malaria is by far the most important insect transmitted disease (Gilles and Warrell, 1993), causing up to 90% of deaths annually in Sub-Saharan Africa. In Kenya alone, out of a total population of about 40 million, an estimated 8.2 million cases of malaria are reported every year (Kindermans, 2002). Malaria is also responsible for about 30 – 50% of all outpatient attendance and another 20% of all inpatient annual admissions in Kenya's public health facilities (MoH, 2006).The distribution of malaria is not uniform, because of geographical differences in altitude, rainfall and humidity. These factors influence transmission patterns, as they determine vector densities and intensity of biting. It is recognized that much of the morbidity and mortality associated with malaria could be reduced provided that existing strategic control measures like ITNs, IVMs, vaccination, and ACT treatment among others are fully undertaken. This study aimed at investigating the influence of infrastructural support and population mobility factors on strategic control of malaria in Homabay Town Constituency. Most of the residents of Homabay Town Constituency reside along Lake Victoria Basin and are highly susceptible to malaria attacks due to the heavy presence of mosquitoes in such regions. Ross' quantitative theory of malaria and mosquito-borne disease transmission and the quantitative foundation of epidemiology that describe adult mosquito movement and the spatial scale of larval control required to reduce mosquito populations and eliminate malaria from an area, formed the major basis of this study. A descriptive survey research design was adopted with a sample of 392 respondents drawn from a target population of 18,932 households from the four Wards of Homabay Town Constituency. Data was collected using questionnaire schedules and the responses were analyzed with the help of SPSS and subjected to chi-square analysis to test research hypotheses. The findings revealed that infrastructural support factors have very great influence on strategic implementation of malaria intervention strategies in Homabay Town Constituency, while population mobility factors have little very little influence strategic malaria control. The study recommends, among other things, that infrastructural development projects should be prioritized in Homabay Town Constituency to up-scale 1. The construction/rehabilitation of major access roads to improve transport network and enhance access to Healthcare facilities; 2. The establishment, equipping and staffing of healthcare facilities to improve their distribution, accessibility and service delivery, and 3. The improvement in communication network through strategic social-sites, websites, print and audio media and emergency help-line interventions.

Key Words: *Infrastructural Factors; Population Mobility factors; Strategic Malaria Control.*

Background of the Research Problem

Malaria is the most important of the parasitic diseases of humans, with 107 countries and territories having areas at risk of transmission containing close to 50 percent of the world's population—more than 3 billion people living in malarious areas (Hay and others 2004; WHO 2005). There were an estimated 198 million cases of malaria worldwide (range 124–283 million) in 2013, and an estimated 584 000 deaths (range 367 000–755 000) with 90% of all malaria deaths occurring in Africa alone (WHO, 2014). In sub-Saharan Africa, malaria is directly responsible for one in five childhood deaths and acts in synergy with other illnesses such as respiratory infections to cause even higher proportion of childhood morbidity and mortality (Breman et al., 2001).

The Roll Back Malaria Partnership, which began in 1998, aimed to halve the burden of malaria by 2010 through the implementation of such control efficacious interventions such as combined anti-malarial therapies and insecticide-treated materials. While ambitious, the initiative has made substantial progress by means of effective and efficient deployment of currently available interventions (WHO 2003, 2005). However, infrastructural, population mobility, Biological, environmental, political, socio-cultural, economic and behavioral factors still influence the strategic control of malaria, thus requiring a multidisciplinary and integrated approach to effectively control the spread of malaria.

An expansion of strategic malaria control measures helped to reduce malaria incidence by 30% globally, and by 34% in Africa between 2000 and 2013. During the same period, malaria mortality rates decreased by an estimated 47% worldwide and by 54% in Africa. In the under-five age group, mortality rates have declined by 53% globally, and by 58% in Africa (WHO, 2014).

Malaria parasites have been eliminated from Europe and North America through the use of residual insecticides and manipulation of environmental and ecological characteristics; however, in many tropical and some temperate areas the incidence of disease is increasing dramatically. Much of this increase results from a breakdown of effective control methods developed and implemented in the 1960s, but it has also occurred because of a lack of trained scientists and control specialists who live and work in the areas of endemic infection. Add to this the widespread resistance to the most effective anti-malarial drug, chloroquine, developing resistance to other first-line drugs such as sulfadoxine-pyrimethamine, and resistance of certain vector species of mosquito to some of the previously effective insecticides and we have a crisis situation (Sirima et.al., 2002).

In response to this pressing social problem of Malaria, in April 2000, the African heads of state committed their governments that by the year

2005, 60% of malaria episodes are appropriately treated within 24 hours of onset of symptom. A strong healthcare delivery system would ideally provide early reliable diagnosis and appropriate prompt effective treatment. However, in most malaria-endemic countries access to curative and diagnostic services is limited (WHO, 2004).

In line with the global initiative to Roll Back Malaria (RBM), the Federal Ministry of Health, of the Republic of Tanzania, developed a five-year national strategic plan for the prevention and control of malaria for the period 2001 –2005. The objective was to achieve a 25% reduction in the burden of malaria by the end of 2005 by ensuring at least 60% coverage in the major malaria intervention that includes access to effective treatment, suitable vector control and detection and containment of malaria epidemics within two-weeks from onset (MOH, 2006).

In order to minimize the burden of malaria, the Government of Malawi is currently implementing a number of interventions at community level. These interventions include, but are not limited to: insecticide-treated bed nets (ITNs), intermittent preventive treatment (IPT) and environmental management. These interventions prevent mosquito bites to avoid infection with, or transmission of, parasites to/from humans, or clear parasites from blood circulation to prevent disease and/or prolonged infection. Environmental management targets mosquito breeding sites in order to reduce vector densities. Under controlled settings, the current malaria interventions have been proven to effectively reduce malaria morbidity and mortality between 19% and 95% depending on the mode of prevention and control and the intensity at which these are implemented. Despite this scientifically proven effectiveness successful implementation has remained a challenge in many African countries including Malawi. These implementation challenges may have arisen, in part, due to socio-cultural beliefs and misconceptions about malaria interventions as well as the economic-related factors including fishing careers that expose the population to mosquito bites and inadequate family incomes. Further to this, lack of proper infrastructural support including sufficient and well equipped hospital facilities, proper and expansive road networks, as well as migration of populations considered to be carriers of the malaria parasites, are also some of the factors that have been highlighted to impede the fight against malaria.

The MOH, Kenya has made significant steps in alleviating the malaria menace. Kenya's Vision 2030 aims to reduce the National impact and burden of malaria through an effective implementation program of various malaria control strategies. These interventions include integrated vector management, Indoor residual spraying, the use of treated bed nets and bedclothes, the use of prophylactic drugs and other anti-malarial drugs a nd vaccination (NMCP, 2012). These strategies hav e registered varying results in various regions across Kenya, especially in the rural communities in

Kenya. For instance, ITNs have been earmarked as one of the most effective methods of malaria control in Homabay County.

New analysis reveals that the prevalence of malaria parasite infection (including both symptomatic and asymptomatic infections) has decreased significantly in Africa since 2000. The number of people infected fell from 173 million in 2000 to 128 million in 2013 – a reduction of 26%. This has occurred despite a 43% increase in the African population living in malaria transmission areas. However, despite this notable decline in malaria cases and associated deaths, in 2013, an estimated 437 000 African children died before their fifth birthday due to malaria. Globally, the disease caused an estimated 453 000 under-five deaths in 2013 (WHO, 2014). It is also still responsible for about 25% of all outpatient attendance and 20% of all annual admissions to public health facilities in Kenya (MoH, 2014).

In Homabay County, for instance, 58,820 cases of malaria were identified for every 100,000 people i n 2015, against a National total of 20,252 cases for every 100,000 people (MOH, 2015). Further, there were 12,479 malaria admissions in the 147 healthc are facilities in Homabay County, against the Natio nal figures of 179,966 malaria admissions, in Keny a's 4,929 healthcare facilities (MOH, 2015). The alarming malaria prevalence in Homabay Town Constituency has awakened various stakeholders (government and non-governmental) to scale up strategic interventions to control malaria through increased distribution and accessibility of treated mosquito nets, insecticide spraying of breeding sites, vector management as well as IRS. However, these intervention strategies have not significantly reduced the rate of malaria in Homabay Town Constituency, prompting the researcher to look into factors that influence strategic malaria control, with particular attention to infrastructural support and population mobility factors.

Statement of the Research Problem

An expansion of strategic malaria control measures helped to reduce malaria incidence by 30% globally, and by 34% in Africa between 2000 and 2013. During the same period, malaria mortality rates decreased by an estimated 47% worldwide and by 54% in Africa. In the under-five age group, mortality rates have declined by 53% globally, and by 58% in Africa. However, despite the notable decline in malaria-associated deaths, the disease still remains a major killer in Africa, and indeed in Kenya. In 2013, an estimated 437 000 African children died before their fifth birthday due to malaria. Globally, the disease caused an estimated 453 000 under-five deaths in 2013 (WHO, 2014). It is also still responsible for about 25% of all outpatient attendance and 20% of all annual admissions to public health facilities in Kenya (MOH, 2014). In Homabay County alone, 58,820 cases of malaria were identified for every 100,000 people in 2015, against a National total of 20,252 cases for every 100,000 people (MOH, 2015). Further, there were 12,479 malaria admissions in

the 147 healthcare facilities in Homabay County, against the National figures of 179,966 malaria admissions, in Kenya's 4,929 healthcare facilities (MOH, 2015). These figures are alarming and imply that Homabay County is still predominantly a malaria hot spot region in Kenya, hence prompting the researcher to investigate the infrastructural support and population mobility factors that influence the implementation of strategic malaria control measures in Homabay Town Constituency, Kenya.

Purpose of the Study

The purpose of the study was to investigate the influence of infrastructural support and population mobility factors on strategic control of malaria in Homabay Town Constituency in Homabay County, Kenya.

Objectives of the Study

The research was guided by the following key objectives:

i. To investigate the influence of infrastructural support factors on strategic control of Malaria in Homabay Town Constituency, Homabay County.
ii. To establish the influence of population mobility factors on strategic control of malaria in Homabay Town Constituency, Homabay County.

LITERATURE REVIEW

Theoretical Framework

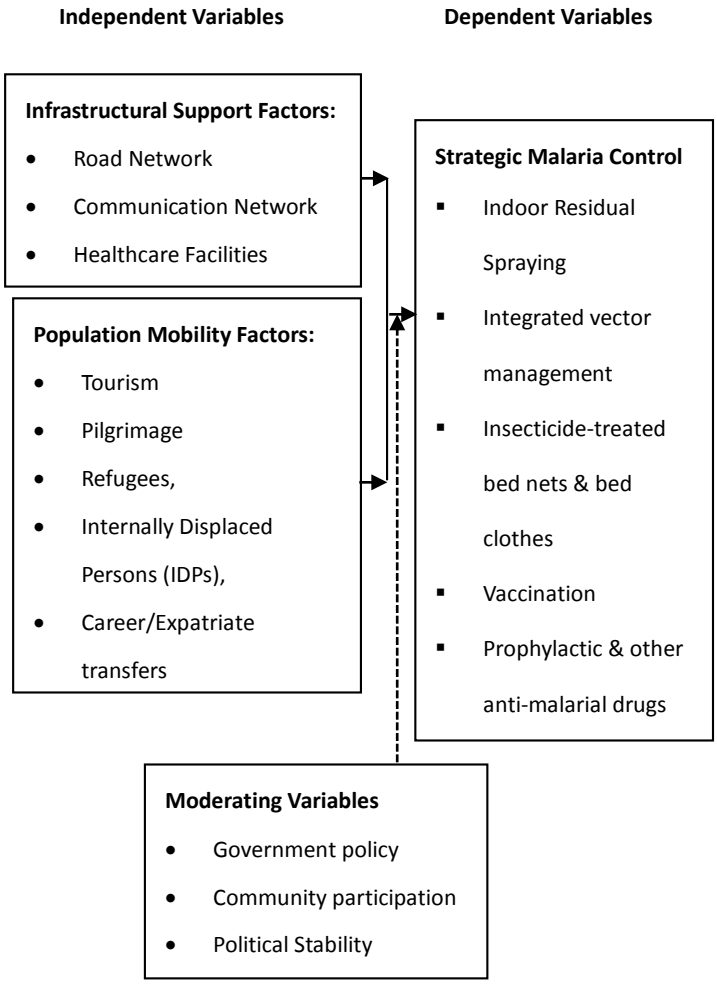
This study borrowed heavily from Ross' quantitative theory of malaria and mosquito-borne disease transmission and also the quantitative foundations of epidemiology that Ross published in 1904. This theory is a mathematical model describing adult mosquito movement and the spatial scale of larval control required to reduce mosquito populations and eliminate disease from an area.

It furthers the concept that if we reduce the number of mosquitoes in the locality by one-half, the mosquito bites will be reduced by one-half; and consequently, only half as many people will now become infected as was formerly the case. But, since the mosquitoes themselves are infected by biting previously infected persons, the percentage of infected mosquitoes, among the insects which remain, will also be reduced in its turn, because the insects will now find fewer infected persons to bite. Hence, ultimately, the number of mosquitoes will be reduced by much more than one-half. In fact, we may perhaps assume that the number of infected persons will be reduced to one-quarter—that is, in the duplicate ratio of the squared percentage of the reduction of the mosquitoes (Ross, 1904). This theory, therefore, supports the very foundations of vector control, upon which this study is based, as a key strategy to control malaria.

Conceptual Framework

The Conceptual Framework of this study looked at infrastructural support and population mobility (independent variables) factors, with their various indicators influencing strategic malaria control in

Homabay Town Constituency. The figure below represents the conceptual framework of the study.



Conceptual Framework

Infrastructural Factors and their Influence on Strategic Malaria Control

The physical environment, and people's proximity and exposure to vectors or parasites, including microbiological and parasitological factors are clearly essential for transmission of infection and constitute necessary and immediate risk factors.

Since malaria is a major problem in rural areas, the remote location of many villages can serve as a barrier to treatment. Proximity to healthcare institutions and access of medical inputs and equipment are major factors influencing strategic control of malaria. Quite simply, if caretakers cannot reach the facilities, they cannot use them. In a study of malaria treatment practices among mothers in Guinea, researchers found that rural mothers who lived farthest from health facilities were less likely to attend them and were tardier in administering medication to sick children than women who lived closer to health clinics (Glik et al, 1989). There are other, more subtle reasons responsible for the difficulties of treating malaria at rural health centres. Transportation is often arduous in remote areas, making timely delivery of supplies problematic. Preventing drug pilfering along the supply route and ensuring that most drugs reach their intended destinations is a concern as well. Finally, preventing deterioration of the drugs during transport can be formidable (Foster, 1991). All of these problems with the supply and quality of drugs at rural health centres can negatively affect people's desires to seek treatment there.

Commuting time to hospital or clinic can also be a serious concern. The nonmonetary cost and inconvenience of attending health centres may be underestimated in studies of health-centre attendance (Snow et al, 1992). In a study of the use of shops in the treatment of malaria along the coast of Kenya, researchers found that mothers preferred to purchase drugs from over-the-counter stores close to home because the women did not

have to go themselves and could send siblings of the sick child or other family members to buy medication while they stayed home and attended to their household duties and other productive activities (Snow et al, 1992). The hours of service are yet another factor, since shops may be open and more convenient in emergencies that occur at times of the day when health facilities are closed (Mburu, Spencer, & Kaseje, 1987), as opposed to the few hospitals, sparsely located within the regions with low staff ratios.

There are, for instance, various reasons why people choose to patronize pharmacies, shops, and even illegal drug sellers in addition to and instead of health centres. First, and perhaps foremost, is the ease of purchasing drugs and obtaining "immediate" treatment. In a study in Maiduguri, Nigeria, the researchers found that immediate attention for both consultation and treatment was the single most important reason for patronizing retail pharmacies rather than health clinics (Igun, 1987). Another important factor was "availability of unadulterated drugs at all times," since the pharmacy was open during hours when the health clinics were closed (Igun, 1987). The inadequacies of the health delivery system in Nigeria were legion, including overcrowded outpatient clinics and wards, non-availability of drugs due either to insufficient resources or mismanagement of funds, and preferential treatment based upon "who you know."

Other barriers to the use of health centres include the long waiting times common at many rural health facilities, as well as shortages of medicines. In a study of self-treatment in a rural area of western Kenya, researchers found that fewer than one in four people went to the rural health centre or to a hospital during any stage of their illness, even though these facilities were free and readily accessible. Reasons included the long wait times at the clinics, the often brusque manner of the overworked staff (who frequently dealt with 50 to 60 patients in a morning), and the frequent shortages of drugs. Furthermore, there was concern and doubt about the effectiveness of the treatments (Ruebush et al, 1995). This was also found to be a problem in a similar study along the Kenyan Coast, where Sokoke mothers preferred to make a 40-kilometre journey to a district hospital in Kilifi District, rather than attending the government dispensary in the area that was much more accessible. They considered the "muzungu" (white) doctors in the malaria clinic to be more qualified, and they believed that they would receive better treatment, even though the rural dispensaries offered fee-free services, while the hospital in Kilifi District charged (Mwenesi, 1994).

Many strategies for malaria control and prevention have not been able to be sustained or implemented due to the failure to incorporate an interdisciplinary and gendered perspective in the design of such programs as well as insufficient consideration of the general accessibility of health institutions, the poor road networks and lack of sufficient equipment and qualified healthcare personnel.

Population Mobility Factors and their Influence of Strategic Malaria Control

Human population movements have also played a significant role in malaria transmission. Since the environment was set for the introduction of malaria to humans in West Africa some 10 000 years ago, changes in settlement patterns and migration carried the infection to the great riverain centres of civilization in Mesopotamia, India, South China, and Egypt (Bruce-Chwatt, 1988). Today, population growth, resulting in resource pressure and redistribution of people from rural to urban areas as well as cyclical migration, is an important factor in malaria transmission. This population rise has also been a primary cause of mobility, which is now easier than ever due to increasingly sophisticated technology and expansion of modern transportation. Natural and man-made disasters further stimulate movement, both small-scale and large-scale, especially by swelling the numbers of refugees (Prothero, 1977). Why, how, and where people move can have profound effects on the distribution and incidence of malaria; moreover, population movements can hinder anti-malaria interventions (Prothero, 1965). Understanding and controlling malaria among mobile populations requires knowledge of population distribution, settlement patterns, the nature and quality of housing, and administrative and social organization, as well as the economic activities in which people engage (Prothero, 1965). Different types of mobile populations present different kinds of problems, each requiring a unique understanding and solution.

Population movement is one of the most important forces in modern-day malaria transmission and distribution in large measure because it is intimately connected with agricultural development and urbanization (Oaks et al, 1991), affecting malaria transmission in four different ways.

The first way is that certain kinds of movement can expose individuals to a variety of health hazards (Prothero, 1977). For example, movement from one type of ecological condition to another can result in new, or increased, exposure of non-immunes. Movements also bring different groups into contact with one another and thus increase the likelihood of malaria transmission. Non-immune people who move into malaria-endemic regions may be at risk for severe illness since they have not yet built up natural defenses against the parasite through repeated and constant infection (Prothero, 1965). Conversely, infected people who move into malaria-free regions may introduce the parasite into new areas if these regions contain an appropriate vector.

Secondly, migrants in new areas often live in conditions that are of lower quality than those of settled populations (Oaks et al, 1991). The living quarters of recently arrived immigrants are usually crowded, often located near *Anopheles* breeding sites, and so poorly constructed that they offer little protection against mosquitoes and the malaria they transmit.

Thirdly, the kind of work that highly mobile people

perform and the conditions under which they work often result in increased exposure to the vector. Illegal activities – such as gem mining, gold prospecting, cattle herding in protected areas such as natural parks, and certain types of hunting – are usually performed during the night, when various vector *Anopheles* are most likely to be biting. Since the nature of these activities requires a high degree of mobility, the people who participate are placed in increasing contact with mosquitoes while being less likely to have access to health care.

Finally, mobile populations are not usually reached by government malaria control programs. Most studies upon which these efforts are based treat human groups as stable entities and do not account for possible mobility (Oaks et al, 1991). Thus mobile populations fall out of the loop of most public health efforts since temporary homes often cannot be identified and therefore do not receive services.

Understanding the different types of mobility in which people engage is important to the success of public health programs aimed at malaria control (Martens & Hall, 2000). A very special form of mobility is that of internally displaced people (usually moving within one country) and refugees (usually having moved from one country to another) caused by civil unrest, war, ethnic strife, famine, and a range of other factors. Refugees and internally displaced populations are particularly vulnerable to the risk of malaria, as the camps in which they live are often in environments prone to vector breeding (Rowland & Nosten, 2001). The refugee camps resulting from complex humanitarian emergencies in different parts of the world create significant risks for malaria, the prevention of which requires applied anthropological research to formulate interventions that are applicable to the particular social, cultural, and physical environments of these camps (Williams & Bloland, 2001). The poor conditions of these camps also make it difficult to screen refugees for malaria (Sullivan, 2000). Yet another aspect is the impact that the movement of a large refugee population has on the geography of malaria. Kazmi & Pandit (2001) studied the shift in the spatial pattern of malaria in the Northwest Frontier Province in Pakistan between 1972 and 1997 and related it to the influx of more than two and a half million Afghan refugees. Shah et al (1997) have also linked the chloroquine resistance and upsurge of falciparum malaria in Pakistan to this influx of Afghan refugees.

In the Brazilian Amazon it is common for settlers to clear forest areas to create land for agriculture. Such human encroachment into new territory disturbs the ecological balance, brings about a rapid increase in possible breeding sites for anophelines, and causes a change in feeding habits among the vector species, from feeding on wild animals to feeding on humans. Since settlers usually build their residences next to thoroughfares (including railroads), perhaps for convenience or to capitalize on the opportunity to sell goods to the occupants of passing vehicles, these roads have often been built by blocking small

rivers and streams, or by building drains for streams that the road crosses. Both strategies produce hundreds of small ponds, ideal breeding environments for anophelines and for exposing settlers in dwellings built next to these roads and ponds (Coimbra, 1988).

Religious pilgrimage is another factor that influences human mobility (Prothero, 1965). Non-immune pilgrims may pass through malaria-endemic areas during their journey and contract the illness in the process. Conversely, pilgrims may then serve as carriers for the parasite into new areas. Infected pilgrims can then spread the disease to non-immunes arriving from different areas, who, in turn, bring the parasite back to their place of origin (Prothero, 1965). The conditions at pilgrimage sites are crowded and thus favor malaria transmission, which is density-dependent. If these pilgrims come from malaria-endemic areas, they may play a part in maintaining malaria prevalence in the island. Indeed, the source of chloroquine-resistant *Plasmodium falciparum* strains on the island hypothetically has been traced back to pilgrims from northern India, where the resistant strains have been documented (Rajagopalan et al, 1986).

RESEARCH METHODOLOGY

The study employed a descriptive survey research design in carrying out the study in Homabay Town Constituency, with a target population of approximately 18,932 households which are spread across the four Wards of Homabay Central (4,556 households), Homabay Arujo (3,954 households), Homabay West (6,250 households) and Homabay East Ward (4,172 households). Homabay Town Constituency, according to National Census 2009, has a population of 94,660 people, with an average number of 5 family members per household, hence the 18,932 households.

The researcher targeted to interview the heads of each sampled household in Homabay Town Constituency. Therefore structured interview schedules were administered to a stratified sample of 392 respondents drawn from the population of 18,932 households using the formula below:

$$n = \frac{N}{1 + (N * e^2)}$$

Where;

N= population size

e= Tolerance at desired level of confidence, at 95% confidence level = 0.05

n= sample size.

While the distribution of the sample across the various strata (Wards) was obtained using the formula:

$$\text{Stratum sample} = \frac{\text{Number of individuals in the stratum X Sample Size}}{\text{Total population}}$$

The responses were collated using percentages, SPSS and subjected to chi-square analysis to test the hypotheses.

RESEARCH FINDINGS, INTERPRETATION AND DISCUSSIONS

Response Return Rate:

The Response rate was considered very good for

data analysis. Out of the 392 sampled households, 346 respondents were interviewed giving a response rate of 88.27%. Some of the household members were not present from their homes or were too committed on other engagements to find time for the interview. According to Mugenda & Mugenda (2003) a response rate of above 50% is good enough for data analysis, above 70% is very good.

Socio-demographic Attributes of the Respondents:

Distribution of Respondents by Gender

Gender of the respondents was recorded and the findings revealed that there is a relatively similar number of male headed households (50.51%) as there are female headed (49.49%) households in Homabay Town Constituency are male-headed.

Distribution of Respondents by Age

The findings revealed that most of the households in Homabay Town Constituency are headed by relatively youthful adult members with about 54% falling within 21 – 40 years age bracket.

Distribution of Respondents by Level of Education:

The study revealed that most of the respondents (67%) had above Secondary level of education, hence are considered educated enough to understand issues around malaria control.

Distribution of Respondents by the Number of years they have lived in Homabay Town Constituency

The findings revealed that more than 90% of the respondents have lived in the Constituency for more than 5 years and are therefore considered to have relevant knowledge about the Constituency, which enhances the credibility of their responses.

Distribution of Respondents by Occupation:

The study revealed that the major economic activities of the region are farming and fishing as confirmed by more than 54% of the respondents. However, a good number of households have members involved in other forms of gainful employment like businesses and rewarding white collar jobs/professional careers.

Malaria Prevalence in Homabay Town Constituency

The study sought to find out whether malaria is a major problem for households in Homabay Town Constituency. The findings revealed that 86.99% of the respondents consider malaria a major problem, while another 11.22% consider it a minor problem. On the other hand, 1.79% of the respondents do not perceive Malaria as a problem in Homabay Town Constituency.

Malaria Intervention Strategies in Homabay Town Constituency

The findings revealed that majority of the respondents accessed ACT treatment as a first line of malaria control, with another 7.4% having been vaccinated—this was due to the proximity of the Homabay Level 4 hospital in Homabay Town. Other popular malaria control strategies amongst households in the constituency include the use of ITNs (26.28%), IVM (13.26%) and IRS (5.36%). On the other hand about 7.4% of respondents still

sought traditional methods as first line treatment in case of malaria symptoms.

Infrastructural Support Factors Influencing Strategic Malaria Control in Homabay Town Constituency

The study revealed that fewer, ill-equipped and under-staffed healthcare facilities was the major infrastructural factor affecting strategic malaria control in Homabay Town Constituency at (50%). This was attributed to lack of modern technology, equipment, test kits and drugs as well as low staff levels at the healthcare hospitals hence often overcrowding and disillusion amongst patients. Poor road networks that hinder accessibility to healthcare facilities and points of sale for drugs, bed nets, insecticides, etc was another major infrastructural factor influencing strategic malaria control according to 30% of the respondents. 20% of the respondents, on the other hand view poor information flow as another infrastructural factor influencing strategic malaria control in Homabay Town Constituency. This was attributed to lack on information on vaccination, distribution centers for nets, insecticides, IRS as well as poor public information about open healthcare days within the Constituency.

Analysis of the Extent of Influence of Infrastructural Support Factors on Strategic Malaria Control in Homabay Town Constituency

The study sought to find out the extent to which various infrastructural support factors (including road network, communication network and healthcare facilities) influence the household's ability to strategically control malaria; as well as to test the null hypothesis:

H_0: There is no significant relationship between infrastructural support factors and strategic malaria control in Homabay Town constituency. A five point Likert scale was provided against which respondents rated these factors. The chi square value was calculated from the tabulated results of the Likert. The calculated value for χ^2at 5% level of significance was 295.05. Since the calculated value was greater than the table value of 5.991, the researcher rejected the null hypothesis and concluded that there is indeed a significant relationship between the listed infrastructural support factors and strategic malaria control in Homabay Town Constituency.

The Extent of Influence of Infrastructural Support Factors on Strategic Malaria Control in Homabay Town Constituency.

Infrastructural Factors	Total Frequency		Very great		Great		Neutral		Little		Very little	
	f	%	f	%	f	%	f	%	f	%	f	%
Availability & Quality of Healthcare Facilities	392	100%	264	67%	121	31%	0	0%	7	2%	0	0%
Road network	392	100%	233	59%	140	36%	8	2%	10	3%	1	0%
Communication network	392	100%	83	21%	288	73%	7	2%	11	3%	3	1%

The findings in the table above indicate that majority of the respondents (67% and 59%) considered availability and quality of healthcare facilities and road network, respectively, to have very great influence on household's ability to strategically control malaria. On the other hand, a further 73% of the respondents considered communication network to have great influence on strategic malaria control. These findings indicate, generally, that infrastructural support factors have very great influence on household's ability to strategically control malaria in Homabay Town Constituency.

Influence of Population Mobility Factors on Strategic Malaria Control in Homabay Town Constituency

The study sought to find out the extent to which various population mobility factors (including tourism, pilgrimage, refugees, IDPs and Career/Expatriate transfers) influence the household's ability to strategically control malaria in Homabay Town Constituency; as well as to test the null hypothesis: ***H_0: There is no significant relationship between population mobility factors and strategic control of malaria in Homabay Town Constituency***. A five point Likert scale was provided against which respondents rated these factors. The chi square value was calculated from the tabulated results of the likert. The calculated value for χ^2at 5% level of significance was 5.49. Since the calculated value is less than the table value of 5.991, the researcher accepted the null hypothesis and concluded that there is no significant relationship between the listed population mobility factors and strategic malaria control in Homabay Town Constituency.

The Extent of Influence of population mobility Factors on the Implementation of Malaria Intervention Strategies in Homabay Town Constituency.

Socio-economic Factors	Total Frequency		Very great		Great		Neutral		Little		Very little	
	f	%	f	%	f	%	f	%	f	%	f	%
Tourism	392	100%	0	0%	32	8%	7	2%	230	59%	123	31%
Career/Expatriate transfer	392	100%	0	0%	65	17%	0	0%	298	76%	29	7%
Pilgrimage	392	100%	0	0%	0	0%	11	3%	27	7%	354	90%
Refugees	392	100%	0	0%	0	0%	0	0%	20	5%	372	95%
IDPs	392	100%	0	0%	0	0%	0	0%	29	7%	363	93%

The findings in the table above indicate that majority of the respondents considered Tourism and career/expatriate transfer to have little influence on strategic malaria control in Homabay Town Constituency. The few cases that showed great influence are movement of fishermen/women to and from Homabay as well as tourist activities related to the presence of Ruma National park in Homabay County. Other cases were attributed to movement of consultants,

teachers, businessmen, health officers into and out of Homabay County. On the other hand, pilgrimage, refugees and IDPS are considered to have very little influence on strategic malaria control due to lack of recognizable cases of the same in Homabay Town Constituency. Generally, it is conceivable to conclude that population mobility factors have little influence on strategic malaria control in Homabay Town Constituency.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The purpose of this study was to investigate the influence of infrastructural support and population mobility factors on strategic malaria control in Homabay Town Constituency. The study established that the major infrastructural support factors influencing strategic malaria control in Homabay Town Constituency include inaccessibility of healthcare facilities due to poor road networks and rough terrains; poor information flow due to poor communication network and few, ill-equipped and under-staffed healthcare facilities in the Constituency. It also established that these infrastructural support factors have very great influence on strategic malaria control in the Constituency.

The study also established that population mobility factors have very little influence on strategic malaria control in Homabay Town Constituency. This is due to very few cases or total lack of pilgrims, refugees and IDPs in the County. Tourism activities are also on the low in the County, with only a few cases of tourists recorded to have visited Ruma National Park and to view Lake Victoria, most of whom are vaccinated and do not carry the malaria parasites into the Constituency, they are actually, the ones under threat of carrying the parasites out of the Constituency. The same scenario suffices for movement due to career/expatriate migration.

Recommendations

In view of the study findings and the conclusion drawn above, this study recommends, among other things, that various infrastructural development projects should be prioritized in Homabay Town Constituency including the construction/rehabilitation of major access roads to improve transport network and enhance access to Healthcare facilities. The establishment of spacious, well equipped and well-staffed healthcare facilities in each of the four Wards in Homabay Town Constituency is also recommended to improve their distribution, accessibility and service delivery. Finally, the study recommends that the flow of health information should be improved through an integrated communication network including the use of social-sites, websites, print and audio media and emergency help-line. Intensive awareness campaigns should be launched in Homabay Town Constituency to sensitize the communities against the danger of malaria and the various strategic interventions that control the spread of the disease.

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