

Malaria Induced Morbidity and Mortality Pattern In Tea-Garden Areas of Sonitpur District, Assam, India

Dr. Moon Moon Bora

Department of Geography
Mariani College/Dibrugarh University
Assam-785634, India

Abstract

Among the diseases of tropical climate, malaria is most common. The disease is mainly caused by at least four parasites carried by Anopheles Mosquitoes. According to the World Health Organization (WHO) about 200 million persons are affected and one million children die each year due to malaria. Among various parasites for transmitting malaria *Plasmodium falciparum* (Pf) and *Plasmodium vivax*(Pv) are common, particularly in North eastern part of India. Malaria, is a term commonly used for a disease that affects human life and reflects the severity and impact by taking a heavy toll. Here an attempt is made to examine the pattern of spread of malaria as well as the malaria induced morbidity and mortality patterns in five selected tea gardens of Sonitpur district of Assam. The study is mainly based on primary data and information collected from five sample tea gardens with certain qualitative stratifications. The results of the study shows significant rate of morbidity and mortality due to malaria in tea gardens of the district.

Key words: Malaria, Morbidity, Mortality, Tea gardens

Introduction:

Among various parasites for transmitting malaria *Plasmodium falciparum* (Pf) and *Plasmodium vivax*(Pv) are common, particularly in Northeastern part of India. Malaria, is a term commonly used for a disease that affects human life and reflects the severity and impact by taking a heavy toll. It is one of the most wide spread diseases affecting humans and remains endemic in many parts of the world. Malaria is also called as a poor man disease as it largely affects the people of poor economy of developing and under developed countries, who cannot

afford the complete eradication and control of malaria. It is a highly vulnerable disease after diseases like measles, TB and AIDS around the world that causes huge loss to economy in terms of money, government efforts, human health and life loss.

Incidence of malaria is a global concern and the World Health Organization has estimated that about 3.3 billion (50%) of the world's population, mostly those living in the developing and poorest countries are at risk of malaria. As many as 106 countries of the world were endemic for malaria in 2009, with 35 countries alone from the continent of Africa. In 2009, around 225 million people became severely ill and about 7,81,000 people died due to the effect of malaria. Of these, 78% of the cases were registered in Africa followed by the South-East Asia with 15% and Eastern Mediterranean regions with 5%. It is estimated that 91% of deaths due to malaria were in the African region, followed by the South-East Asia (6%) and Eastern Mediterranean regions (2%). Malaria has emerged as a serious disease especially in Africa, where one in every five (20%) child death is due to outbreak of this disease.

Malaria is more prevalent in the developing countries of the world, which are located in tropical and sub-tropical areas. Various eradication measures have been carried out since the fifth decade of 20th century and these have suppressed the epidemic to some extent. However, the global climatic change, increasing human movement, explosion of population, the socio-economic conditions of people and also the emergence of drug-resistant malarial parasites and insecticide resistance mosquito vectors in recent years have increased the number of reported cases

Malaria is endemic in many parts of Assam with *Plasmodium falciparum* being the predominant parasite. The Sonitpur district located in the central North bank plain of the Brahmaputra valley, Assam with three sub divisions and seven revenue circles are essentially a region based on agrarian economy. Its areal extent is from 26°30' N to 27°01' N latitude and from 92°16' E to 93°43' E longitude. The district receives average annual rainfall of 182 cm. Summer is hot and humid with an average temperature of 29° C. The highest temperature is recorded just prior to onset of the monsoon (around May to early June). Summer rainfall is heavy and principally caused from the late June to early September by the moisture laden south-west monsoon wind, on striking the Himalayan foothills on the north. The topography of the district is characterized by numerous flood prone rivers and valleys along with narrow foothills of Himalayas in northern margins. This foothill region is characterized by tropical deciduous and evergreen forest and undulating topography with a numbers of swampy areas, which provides suitable breeding ground for mosquitoes. Besides, tea plantations of the district with a moist and humid environment favour the outbreak of malaria. Most of the inhabitants of tea gardens are frequently affected by the disease, especially by *Plasmodium falciparum* parasites. The tropical monsoon climate of the region with hot and humid summer along with relative humidity of above 80% for most part of the year is another important factor that helps in spread of the disease in the region. Besides social and economic conditions of the inhabitants also have significant bearings in the spread of this parasitic disease. Therefore it may be mentioned here that all these factors makes the environment conducive for mosquito proliferation, survival and longevity and also favours active malaria transmission. Keeping all these facts in view, the tea gardens of Sonitpur district of central Assam has been selected for the study, as these tea gardens are highly sensitive to the malarial infection. The study will definitely helps in to find out the physical, and socio-economic factors that are responsible for morbidity and mortality due to malaria in the selected tea gardens of the district.

Objectives of the Study

The objectives of the study are

1. To review the malaria attributable morbidity and mortality among the inhabitants of the selected tea gardens.
2. To study the performance of Govt. Health and Malaria control department and other Govt. and Non Govt. Organizations in controlling malaria in the selected areas

Materials and Methods

Sample area: The study has been conducted in 5 tea gardens of Sonitpur district namely Dhekiajuli, Belsiri, Ghogra, Rupajuli and Durung.

Data Collection:

The study is mainly based on primary data and information. The required primary data have been collected through sample survey in 5 selected tea-gardens. The samples are selected at random with certain qualitative stratification. The primary data have been collected through using household survey questionnaires from these tea-gardens and in each of the gardens 100 numbers of household have been considered for the primary survey.

All such data and information have been tabulated, compiled, analyzed, compared and also represented in form of tables, charts, graphics and Carto-statistical methods.

Results and Discussion:

MALARIA INDUCED MORBIDITY AND MORTALITY PATTERN

Morbidity and Mortality are important components of population change in any area. It is the result of a number of factors, which are physiological, demographic, environmental and economic in nature. Morbidity or occurrence of disease and Mortality or occurrence of death varies both over space and time. The temporal changes in death rate not only affect the size of population, but also its age composition, which has significant bearing on social economic and demographic spheres of an area.

Household investigation shows that numbers of people of the tea-gardens under the study have been affected by malaria during the last two years from the survey. However, proportion of positive cases of Malaria that have been reported during the last two years are presented in the table 1

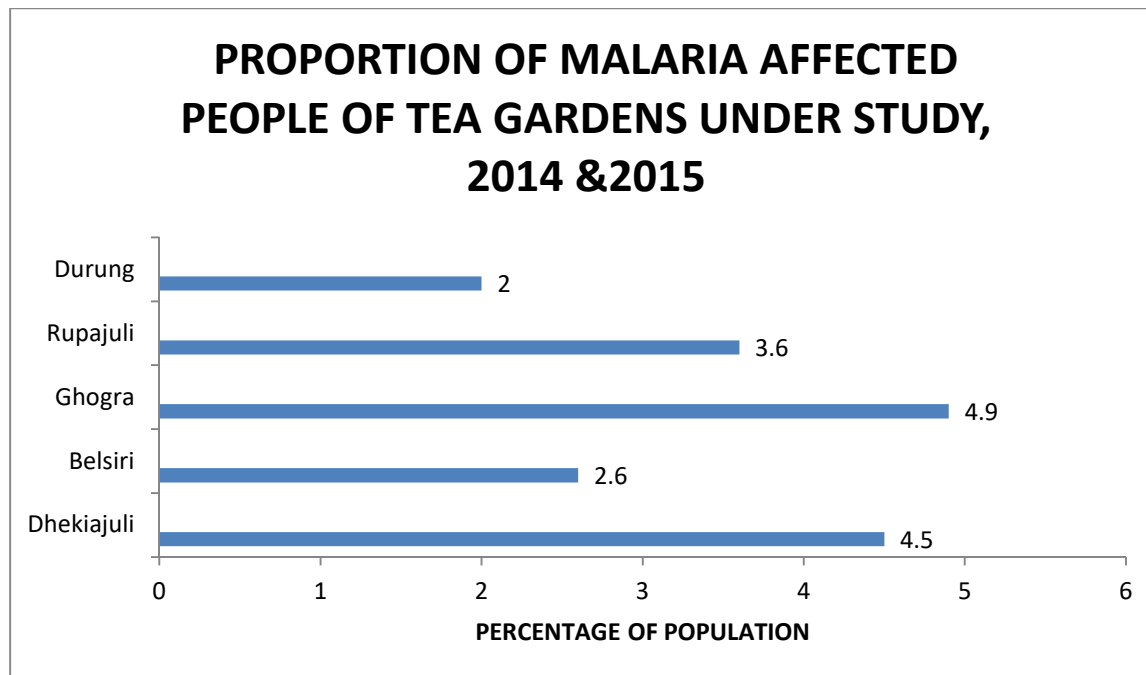
Table: 1 proportion of malaria affected population in selected tea gardens in last two years (2014 and 2015)

Name of the Tea-Graden	Proportion of affected people to total
Dhekiajuli	4.5
Belsiri	2.6
Ghogra	4.9
Rupajuli	3.6
Durung	2

Source: Primary survey, 2015

It reveals from the table 1 that in Ghogra tea-garden the highest i.e. 4.9% people were affected by the malaria disease during the last two years of the survey. Ghogra is followed by Dhekiajuli (4.5%) and Rupajuli (3.6%) tea-gardens in terms of the people affected by the disease during the same period. However, the Belsiri and Durung teagardens are characterized by relatively lower proportion of people affected by the disease i.e. 2.6% and 2% respectively for the districts. Fig:1 shows the Proportion of malaria affected population in selected tea gardens in last two years (2014 and 2015)

Fig: 1 Proportion of Malaria affected people



Sex and Age Disparities in Spread of Malaria:

An investigation into the infection of malaria on male and female population shows that, higher proportion of male population under the surveyed tea gardens of the district are affected by the disease. The Table 2 clearly shows the proportion of malaria affected male and female population of all the tea gardens under study.

Table 2 : Sex Disparity in Malarial Infection

Name of the Tea-Graden	% of affected Male population	% of affected female population
Dhekiajuli	60.00	40.00
Belsiri	69.23	30.77
Ghogra	65.21	34.79
Rupajuli	47.05	52.95
Durung	55.55	44.45

Source: Computed by the researcher, 2016

It reveals from the table that, except Rupajuli Tea-garden, the more proportion of male population of all other surveyed gardens have been affected by malaria. The proportion is highest in Belsiri, where 69.23 % males are affected. On the other hand, In Rupajuli Tea garden 52.95 % female population are affected by this disease, which is highest among the females of all surveyed gardens. Again an observation in to the affect of Malaria on age reveals that , the vulnerability of the disease is more among the children than adult and old age groups. The Table 5.3 clearly shows the situation. It is observed that except Rupajuli all other tea gardens namely Dhekiajuli, Belsiri, Ghogra and Durung have highest proportion of malaria affected population , mostly of below 14 years of age. Thus, one can conclude that children are more prone to malaria than the adult population. This proportion found to be highest in Ghogra Tea garden with about 70 % of malaria affected people in the age group below 14 years.

Table 3: Proportion of malaria affected population in age group 0-14 in surveyed tea gardens

Name of the Tea-Graden	Proportion of malaria affected population in age group 0-14
Dhekiajuli	60.00
Belsiri	69.23
Ghogra	65.21
Rupajuli	47.05
Durung	55.55

Source: Computed by the researcher, 2016

Influence Literacy and Education

Education is considered as an important factor that determines the occurrence of malaria in a population. It is found that the knowledge about malaria and the measures taken by literate families have significantly reduced the degree of malaria incidence. Illiteracy or ignorance about malaria is one of the major causes for spread of malaria. In order to study the causes that are responsible for the outbreak of malaria in the selected tea gardens of the Sonitpur district ,we may consider a number of factors. Among which the illiteracy is one of the important social factor.Literacy, which plays a crucial role in socio-economic development in a country or population, is also an important social determinant mortality. Literacy or educational attainment of people generally inversely correlated with the number of death in any region or population group. A scientific investigation of literacy pattern and malaria induced Mortality both over space and through time is highly necessary in order to have a clear picture on impact of literacy on spread and outbreak of Malaria. It is seen that in Dhekiajuli (11.4%) and Ghogra (22.6%) tea-gardens literacy rate is comparatively low and the proportion of people affected by the malaria is high in both the gardens, i.e., above 4.5 %. It may be important to mention here that literate

people are more health conscious and they acquire the knowledge about cleanliness and conditions for spread of malaria as well as their prevention. That is the main reason for what it is seen that intensity of malaria is less in the tea-gardens where literacy rate is comparatively high. The result of bi-variate correlation shows that there is a strong negative correlation ship between these variables, i.e. Literacy rare (X) and Proportion of malaria affected people (Y).

The correlation coefficient value is found as -0.796, it indicates that increase in literacy rate (X) causes decrease in Proportion of malaria affected people(Y).

Table 4. Relation of Literacy and Proportion and Use of Mosquito-net with Malaria

Name of Teagarden	Proportion of affected people to total	Literacy rate (in %)	% of families using Mosquito-net
Dhekiajuli	4.5	11.4	25
Belsiri	2.6	36.9	44
Ghogra	4.9	22.6	27
Rupajuli	3.6	30.5	41
Durung	2	33.3	48

Source: Computed by the researcher, 2016

Another important factor that directly related to the spread of malaria is the use of Mosquito-net by the people of these gardens. The table 4 clearly explains this phenomenon. It is seen that in Durung, Rupajuli and Belsiri the proportion of families using mosquito-net is comparatively high, hence in these-gardens proportion of malaria affected population is proportionately low. The result of bi-variate correlation shows that there is a strong negative correlation ship between the use of mosquito net(X) and the Proportion of malaria affected people(Y). The value of correlation coefficient is found as -0.951 i.e. increase in the use of Mosquito-net results in the lowering the rate of malaria (y).

An analysis of death due to malaria in the selected tea-gardens of Sonitpur district shows that altogether 8death cases have found to be occurred in these gardens during the last two years of the survey (i.e. 2014 & 2015). Among which each of Ghogra and Rupajuli tea-gardens registered 3 malaria attributed death cases, while Dhekiajuli and Belsiri recorded 1 case each during the same period.

Role of Govt. Malaria Control Department in controlling malaria:

The state govt. through its Malaria control department has undertaken a number of interventions for control of the vulnerability of malaria. Among which spraying of DDT in houses, destruction of mosquito habitat within in the campus, distribution of drugs and medicines etc are important. The national Rural Health mission also plays a responsible role in regards to the treatment of malaria in the local hospitals located in tea gardens.

Table 5 Measures for control of malaria in the previous year of survey, 2015

Name of Tea-gardens	Measure for control of malaria in the last year of survey	
	Percentage of families benefited by DDT spraying	Percentage of families receiving regular supply of drugs
Dhekiajuli	90	79
Belsiri	87	75
Ghora	95	70
Rupajuli	79	73
Durung	81	84

Source: Primary Survey, 2016

The table 5 represents some information on measure for controlling the outbreak of malaria from the government side during the last year of survey. It is seen from the table that in Dhekiajuli Tea-garden, maximum i.e. in 90% households, DDT spraying have been done by the Malaria-control department during the period. On the other hand only 79% households of Rupajuli Tea-garden have benefited by the invention.

So far the regular supply and distribution malaria drugs is concerned, it is well observed from the table 2.9 that in all the Tea-gardens under study more than 70% families have received the drugs regularly during the last year of the survey(i.e. 2015)

Conclusion:

Proper awareness should be created among the population of the tea-gardens regarding the condition for spread of malaria as well its affect and nature of treatment. Various awareness camps, workshops by different NGO and Trust may play an important role in this regard. Again, it seen that literacy is negatively related to the rate of the affect of malaria, hence proper steps should be taken for improving the present literacy level of the inhabitants of these tea-gardens. Proper steps should be taken for the development of overall house environment of the tea-gardens i.e. improvement of air-circulatory system, drainage system, cleanliness etc. Besides, identification of habitat of Malaria and their destruction is prime requirement for controlling malaria.

References:

- Agrawal, V.K. (2008) : Journal Armed Forces India, Vol. 64, No. 1, pp. 57-60.
- Allen, B.C. (1905) : *Assam District Gazetteers, Darrang*, Allahabad, Vol. V. pp. 1-2,6, & 53.
- Bagchi, M. and Kar, B.K. (2008) : Pattern of malaria incidence and problems of its management in Assam: A study in medical geography. In S.Deka (Ed.), *North East India Geo-environmental issues*. EBH Publishers (India), Guwahati, pp. 291-311.
- Barthakur, M. (1986) : “Weather and Climate of North East India”, *North Eastern Geographer*, Vol. 7, No. 1 and 2.
- Bora, A. K.(2001) : Drainage and Flood, *Geography of Assam*, A.K. Bhagabati *et al.* (ed.), pp-36-51, Rajesh Publications, New Delhi
- Bora, A. K.(2001) : Physical Background, *Geography of Assam*, A.K. Bhagabati *et al.* (ed.), pp-18-35, Rajesh Publications, New Delhi
- Census of India, : *Primary Census Abstract, 2001*, Directorate of Census operation, Assam.
- Das, H.P. (1970) : *Geography of Assam*, National Book Trust of India, New Delhi
- Das, M.M. (1981) : “Pattern of Soil Distribution in Assam”, *North Eastern Geographer*, Vol. XIII, No. 1& 2
- Dev, V., Bhattacharyya, P.C. and Talukdar, R. (2003a) : Transmission of malaria and its control in the Northeastern region of India; *Journal of the Association of Physician of India*; Vol. 51, pp.1073-1076

- Dev, V., Phookan, S. and Barman, K. (2003b) : Therapeutic efficacies of anti malarial drugs in the treatment of uncomplicated Plasmodium falciparum malaria in Assam, North-eastern India; Annals of Tropical Medicine and Parasitology, Vol. 97, No. 8, pp. 783-791
- Dutta, N.C.(1978) : *Assam District Gazetteers, Darrang District* , Government of Assam, Guwahati, pp. 1-41, 53-83, 101102,153-155 and 355-388.
- Kar B. K.(2001) : Population, *Geography of Assam*, A.K. Bhagabati *et al.* (ed.), pp-115-155, Rajesh Publications, New Delhi.
- May, J.M. (1950-55) : Atlas of diseases, American Geographical Society
- Saikia, D. (2000) : Pattern of Agricultural Land-Use change in Sonitpur District, Assam, Unpublished M. Phil. Dissertation, Gauhati University, Guwahati.
- Sarma, K.(2001) : Forests, *Geography of Assam*, A.K. Bhagabati *et al.* (ed.), pp-52-67, Rajesh Publications, New Delhi.
- Sonitpur Agriculture: : Where we Stand (2003-04), A Departmental Profile , Department of Agriculture, Sonitpur, Assam.
- Taher, M. and Ahmed, P (1998) : Geography of North East India, Mani Manik Prakash, pp. 1-21, Guwahati.