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REGIONAL PATTERN OF MALARIA AND IDENTIFICATION OF HIGH RISK ZONES IN SONITPUR DISTRICT OF ASSAM

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ABSTRACT

Malaria is one of the life-threatening diseases and it was known from the ancient time. Malaria was known to be a world-wide problem, but now it occurs in some specific areas especially in the tropical areas. Sonitpur district of Assam is associated with this fatal disease from time to time. The environmental factors of Sonitpur district are highly responsible for the occurrence of this particular disease. All the health blocks of the district are more or less affected by Malaria. Some regions are more vulnerable to this dangerous disease. Within the district, the frequency of Malaria is found to be variable, spatially as well as temporally. This paper aims to analyze the frequency of Malaria within the district from one region to another. The paper also aims to identify some high risk zones of Malaria in the district. This paper would be helpful to medical personnel and planners for preparing a suitable plan or policy to combat ever-increasing Malaria in the district.

Keywords: Malaria, Spatio-Temporal Pattern, High Risk Zones, Sonitpur

INTRODUCTION

The word 'malaria' is a combination of two Indian words, i.e. 'mad' meaning bad and 'aria' meaning air. The name malaria was applied to the disease because in ancient time it was believed that the disease occurred due to inhalation of poisonous

emanations from the ground surface, especially marshy land. Malaria has been considered as one of the life-threatening infections caused by Protozoan Parasite. It is still a foremost public health concern of most endemic patches of the world [1].

This dangerous infection is transmitted by female *Anopheles* mosquito that claims almost three people every four minutes [8].

Malaria was known to be a world-wide problem, but now it occurs in some specific areas especially in the tropical areas. In fact, malaria is restricted to some specific regions in its distribution. Malaria affects 36% of the world population in 107 countries and territories placed in the tropical and subtropical provinces. In the South-East Asian region, out of about 1.4 billion persons living in 11 countries, 1.2 billion (85.7%) are visible to the risk of malaria, and most of them live in India [2].

Malaria is an intense ancient disease characterized by repeated attacks of fever. Malaria disease was said to be the most vital human health problem about 20 years ago and killed millions of people across the world. The economic loss from the malaria knew no bounds. After the Second World War, the incidence of malaria declined gradually. After 1945, the great discovery and use of D.D.T has reduced the incidence of malaria disease in most of the countries. With the effective use of D.D.T. malaria has been either controlled or eliminated from most of the countries.

Malaria is typically caused by *Plasmodium* parasite carried by the female *Anopheles* mosquito. *Anopheles* mosquitoes carry this *Plasmodium* parasite, and when

these mosquitoes bite people the parasite is released into people's bloodstream. Once the parasites enter into bloodstream, the parasites travel to the liver where they get mature. After few days the mature parasites enter the bloodstream and starts infecting red blood cells. Within 2 or 3 days, the parasites in the blood cells multiply, leading to infected cells to burst open. The life cycle of the plasmodium protozoan includes three basic stages. The first stage occurs in the mosquito's body and the second and third stages take place in a person [6].

India has a long record of success and fights with Malaria control [5]. In 2018, an estimated 228 million cases of malaria occurred worldwide, compared to 251 million cases in 2010. In India, a population of 126 million was at danger of malaria with an estimate of 6 million cases in 2018 [7]. In India, districts with 30% or more tribal population added to 46% of total Malaria cases and 47% Malaria deaths in the country [4].

In India, Malaria is found to be highly distributed in rural and tribal regions of Madhya Pradesh, Orissa, Maharashtra, Rajasthan, Jharkhand etc. Urban areas contribute about 15% of the total malaria cases reported in India and are primarily associated with construction activities and migrant population [3]. In Sonitpur area of

Assam, incidence of Malaria has been found to be acute. The climatic conditions and geographical factors of the region contribute to the occurrence of such disease in the region since early times.

MATERIALS & METHODS

In the study only secondary data are used. In order to collect relevant data many sources have been taken into consideration. Data concerned with spatial distribution of various diseases in the study area have been collected from the Office of the Health & Family Welfare (IDSP), Sonitpur District, Assam. Moreover, books as well as journals related to Medical Geography are also taken for detail analytical study. In few cases, internet links have also been taken into consideration for further study. In order to prepare maps of disease distribution or risk zones, AutoCad map software has been used.

In the study, spatial distribution of Malaria disease has been proposed to be analyzed at the block level of the Sonitpur District. The study is carried out by taking seven health blocks with certain specific diseases. Analysis has been done with absolute data of incidence of diseases. The collected data have been systematically tabulated to show the temporal as well as spatial variation of the incidence of diseases in all the health blocks of the district. Taking into consideration of the

above methods, the proposed study has been done in a proper way.

RESULTS & DISCUSSION

The district of Sonitpur has been divided into seven health blocks, and all the health blocks are characterized by frequency of Malaria in different time periods. In the district, total number of malaria case diagnosed from 2011 to 2016 is **1,93,431** in number. Among the health blocks of the district, the highest malaria cases are found in Dhekiajuli health block where the total incidence from 2011 to 2016 is **57490**, which is about 30% of the total malaria cases of the Sonitpur district. Dhekiajuli region is followed by North Jamuguri health block, accounts about 29% of the total cases of the study area. Bihaguri health block ranks third in this regard with total cases of **33522** (17.33%), which is followed by Balipara health block, Biswanath health block, Behali health block and Gohpur health block where the total cases of malaria disease from 2011 to 2016 are **21098** (10.91%), **14235** (7.36%), **10115** (5.23%) and **1138** (0.59%) respectively.

The temporal variation of Malaria incidence has been observed in the district. The incidence of malaria disease is not same within the health blocks of the district from 2011 to 2016. The incidence of

malaria is highly fluctuating among the BPHCs from one year to another (**Table 1**). From the **Table 1**, it has been found that the lowest incidence of malaria occurred in Gohpur BPHC where total cases of malaria are **1138** from 2011 to 2016, which is very low compared to other health blocks of the district. It is worth mentioning that in 2016 there are only **18** malaria cases found to be occurring in Gohpur BPHC. The second lowest malaria incidence has been found in Behali health block where total incidence of malaria from 2011 to 2016 is **10115** with year-wise variation of 1,834 (2011), 1,886 (2012), 1,576 (2013), 1,252 (2014), 1,771 (2015) and 1,796 (2016).

High Risk Zones of Malaria

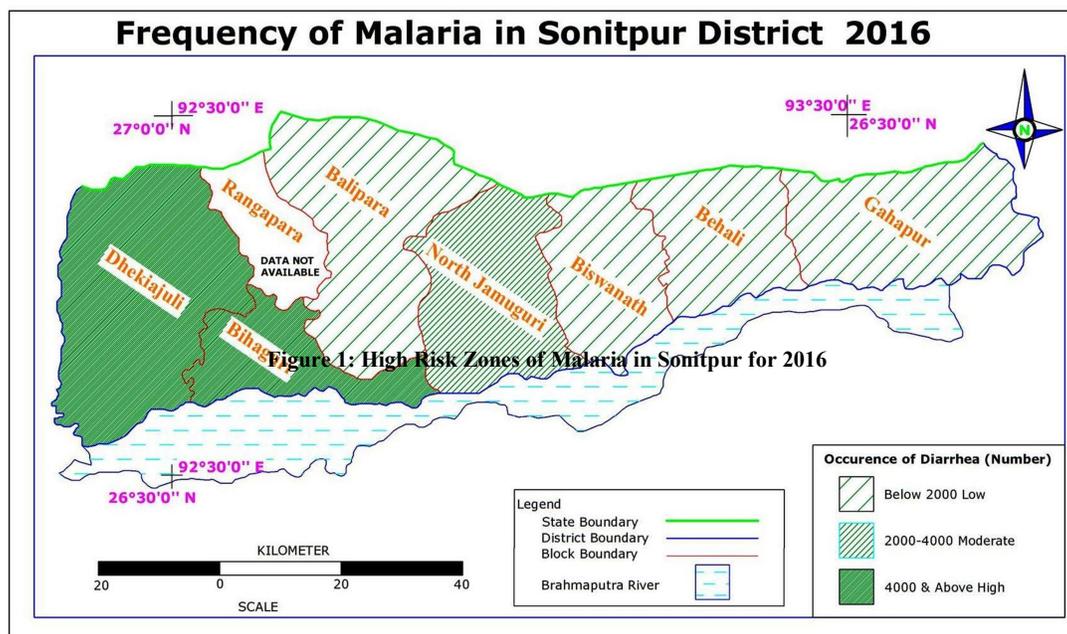
From the analysis of the above facts, the study aims to understand the spatial variation of Malaria along with its vulnerable locations in the district. Some health blocks of the district are

characterized by high incidence of Malaria, while some others are characterized by less number of the same. Based on this fact, the study has identified some high risk zones of Malaria in the district (**Figure 1**).

From the **Figure 1**, it has been cleared that Dhekiajuli and Bihaguri health blocks of the district are highly affected by Malaria, where incidence reached above 4000. North Jamuguri health blocks showed the incidence between 2000 and 4000, while other health blocks are characterized by the incidence below 2000 cases of Malaria. From these facts, Dhekiajuli and Bihaguri area of the district have been identified as high risk zones of Malaria, North Jamuguri area as moderate risk zone, and other health blocks have been identified as low risk zones of Malaria.

Year	Table 1: Temporal and Spatial Distribution of Malaria Cases (in number) in Sonitpur, 2011-16							Total
	Gohpur BPHC	Behali BPHC	Biswanath BPHC	Jamuguri BPHC	Balipara BPHC	Bihaguri BPHC	Dhekiajuli BPHC	
2011	647	1834	4194	15628	8072	7895	10064	48334
	1.34%	3.79%	8.68%	32.33%	16.70%	16.33%	20.82%	
2012	99	1886	3188	13100	4863	6184	13314	42634
	0.23%	4.42%	7.48%	30.73%	11.41%	14.50%	31.23%	
2013	22	1576	2270	11505	2490	5176	11988	35027
	0.06%	4.50%	6.48%	32.85%	7.11%	14.78%	34.23%	
2014	121	1252	1873	9086	3053	4498	11458	31341
	0.39%	3.99%	5.98%	28.99%	9.74%	14.35%	36.56%	
2015	231	1771	1484	3534	1336	4198	5657	18211
	1.27%	9.72%	8.15%	19.41%	7.34%	23.05%	31.06%	
2016	18	1796	1226	2984	1283	5570	5007	17884
	0.10%	10.04%	6.86%	16.69%	7.17%	31.15%	28.00%	
Total	1138	10115	14235	55839	21098	33522	57490	193431
	0.59%	5.23%	7.36%	28.87%	10.91%	17.33%	29.72%	

Source: Office of the Health & Family Welfare (IDSP), Sonitpur



CONCLUSION

Malaria is seen to be more prominent in Dhekiajuli, North Jamuguri and Bihaguri BPHCs because in these regions the environment seems to be favorable for the generation of a lot of female *Anopheles* mosquitoes which are the main reasons of the occurrence of Malaria. Use of D.D.T. can reduce the incidence of Malaria, but in these regions use of D.D.T. seems to be very poor. This might be another reason for the occurrence of higher number of Malaria cases in these particular health blocks. On the other hand, Gohpur and Behali BPHCs are characterized by well environmental conditions that do not allow much generation of female *Anopheles* mosquitoes and hence, lowest number of Malaria incidences has been occurred in these two blocks. Use of

D.D.T. is also seems to be good, which might be another reason for the lowest number of Malaria incidence in these two particular health blocks.

Health care personnel are trying their best to reduce cases of Malaria in the district, but it is still threatening most of the people of the district. The elimination of Malaria needs some suitable approaches and strategies from the village level to the regional level. All people with confirmed cases must be advised to stay under mosquito net until parasite clearance to avoid community spread. Availability of drugs and essential Malaria commodities should be ensured for long term management of community Malaria.

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