

**IMPACT OF MALARIA ON PUBLIC HEALTH AND ITS
PREVENTION-A COMPARATIVE STUDY OF SELECTED
HOSPITALS AND ENDEMIC ZONES UNDER KMC'S
JURISDICTION**

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ABSTRACT:

Even a century after the discovery of malaria transmission through mosquitoes in India by Sir Ronald Ross in 1897, malaria still continues to be one of India's leading public health problems. When studies and researches questioned 'what exactly malaria costs India' recorded various socio-economic burden on humanity as well as hampered and lowered the physical and intellectual standards of the nation slowing down its prosperity economic progress in every way. In the South East Asian Region of WHO, out of about 1.4 billion people living in 11 countries, 1.2 billion are exposed to the risk of malaria and most of them are from India. Among the urban centers of the country Kolkata and its suburban areas are regularly getting affected by malaria since the post independence period and held its top position quite deliberately. Though the 'Eradication Era' started from 1950 and showed reducing number of cases till 1960 but there was a constant fluctuation in mortality and morbidity rate due to the burden of malaria till 2000. The spread of disease among the people living in slums and settlements in and around central part of Kolkata is a major concern of health authorities as well as KMC personals. People coming from rural Bengal are flocking together in hospitals situated in the central part of the city in huge number. An in-depth analysis of the infrastructure of a government and a private hospital and prevailing condition of patients admitted there has been carried out to identify the factors responsible for breakout of the disease and its proper treatment. A comparative study of the hospitals will reveal some shocking facts which will compel the common people to ponder over

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their future well-being. As the Eight Millennium Development Goals suggested by UN among which there are health related goals; calling for improvements in health by 2015. Apart from reaching goals there is a need for substantial improvement of all aspects of public health which can be done through halting to the spread of malaria transmission so for the improvement of the conditions of people residing in Kolkata, the cultural capital of India. Government should also play proactive role for educating the people regarding prevention, control and complete eradication of malaria from urban environment of Kolkata.

Key words: Malaria, Hospital, KMC, Health, Prevention.

Introduction: The countries across the world have agreed to a common point that every individual should enjoy the highest attainable standard of health and is one of the fundamental rights of every human being without discrimination of race, caste, religion and political, socio-economic condition. Among the eight Millennium Development Goals (MDGs) declared by UN, commit countries to half the extreme income poverty and to achieving improvements in health by 2015. Among the eight Millennium Goals calling for a reduction of half to the spread of HIV/AIDS, Malaria and Tuberculosis. Recent studies reveal that among all the vector-borne diseases malaria is the most endemic in nature compare to other vector borne diseases among the 11 South-East Asian Countries. India has reported a slow but steady decline in case numbers over the past decade, falling by 28% between 2000 and 2010, while continuing to examine more than 100 million blood slides each year.

West Bengal is one of the state considered highly endemic for malaria in India. Among the positive cases most of them are Plasmodium falciparum malaria, the most acute dead form of the disease.

Kolkata is still considered the most malaria prone district of West Bengal in India. The outbreak of malaria is very common due to the climatic condition and urban life styles maintained its place since the birth of the city. As being one of the most crowded congested old city the hospitals of Central Kolkata always have a pressure of patients affected by malaria. An overall review of one government hospital and one private hospital give a clear picture of how

the emergence and resurgence of such kind of disease affect the people of Kolkata in an endemic as well as epidemic manner.

Table 1: Table showing Epidemiological Profile of Malaria in India

Population (UN Population Division)	2010	%
High transmission (>1 case per 1000 population)	273 000 000	22
Low transmission (0-1 cases per 1000 population)	832 000 000	67
Malaria-free (0 cases)	137 000 000	11
Total	1242 000 000	

Parasites and vectors

Major plasmodium species: *P.falciparum* (51%), *P.vivax* (49%)

Major anopheles species: *An.stephensi*, *culicifacies*, *fluviatilis*, *minimus*, *dirus*, *annularis*

Source: World Malaria Report, 2012

Objectives :- India join as a party to UN conference on Environment and Development (UNCED) in 1992 then the country has focused in the environment related issues. The policies adopted in National Conservation Strategy addresses issues related to sustainable development where health is a major issue. From that time health has become an important parameter concerning social environment, the traditional category of the vector borne diseases like malaria has a tremendous risk factor. Kolkata being one of the major centre of these out breaks, attracted the attention to study the environmental impact of this disease which is traditionally affecting the people living in the core areas as well as the city suburbs. So various objectives are set prior to the investigation. They are –

- To estimate present status and trend of Malaria in these selected hospitals.
- To determine time, place, person distribution of Malaria in KMC area where those hospitals are situated.
- To indentify the risk factors.
- To recommend control strategies of Malaria.

- Unawareness, lack of literacy, deficiency of the existing system, lack of concern of the KMC has maximized the health hazard and risk. So emphasis is given to the basic ground by choosing these two hospitals which are the main centre of malaria disease where from knowledge can be gathered.

Database: The study requires various types of data. Primary and Secondary both types of data were collected.

- Primary data were mainly collected on the basis of questionnaire which was prepared prior to field investigation. Survey was conducted to fulfill the requirement.
- Secondary data were collected mainly from the selected hospitals, ISPD report, Kolkata Municipal Corporation and Swastha Bhavan, World Malaria Report, Malaria Statistics of India, WebPages.

Methodology: The methodological purpose is fulfilled by (i) Revisal, preparation of base map as well as questionnaires followed by (ii) framing of survey schedule, collection of secondary data from the selected hospitals and (iii) conducting perception survey for generation of primary data. The sampling type is purposive. Patients are surveyed in those hospitals knowing the fact that the amount is very negligible in comparison to the total affected patients.

After computation and transformation of data into information supported by cartographic representation it can be known that Malaria almost routinely hit the people of Kolkata every year.

DISCUSSION:

Study Area: Kolkata always remain in the upper position when it comes to this type of disease. It is well known that malaria almost routinely hit people of Kolkata every year. The urban high risk criteria considers Slide Positivity Rate (SPR) 10% and above during any of the last 3 years. For a single year data in an urban area of population not less than 50000, SPR should be more than 5% or the ratio of clinical malaria cases to fever cases should be more than one-third as per hospital or dispensary statistics during the last calendar year, Keeping the former criterion in mind it was found that wards in borough V, VI and VIII are at high risks. Among 141 wards of KMC, 67 wards were found to be high risk of malaria. So, keeping in mind two different

hospitals mainly from Central Kolkata are taken into consideration for a small scale representation of the work. Nil Ratan Sarkar Medical College and Hospital(22°33'50"N and 88°22'05" E) situated within borough VI and ward No. 55 is selected as Government Hospital and Ramkrishna Mission Seva Prasthan(22°31'23" N and 88°21'16" E) situated within Borough-VIII, Ward No. 84 is considered as non-Government Hospital run under the Ramkrishna Mission Math. These two are selected for better comparison of the environmental impact of the vector borne disease like Malaria in Kolkata with their traditional way of affecting the people.

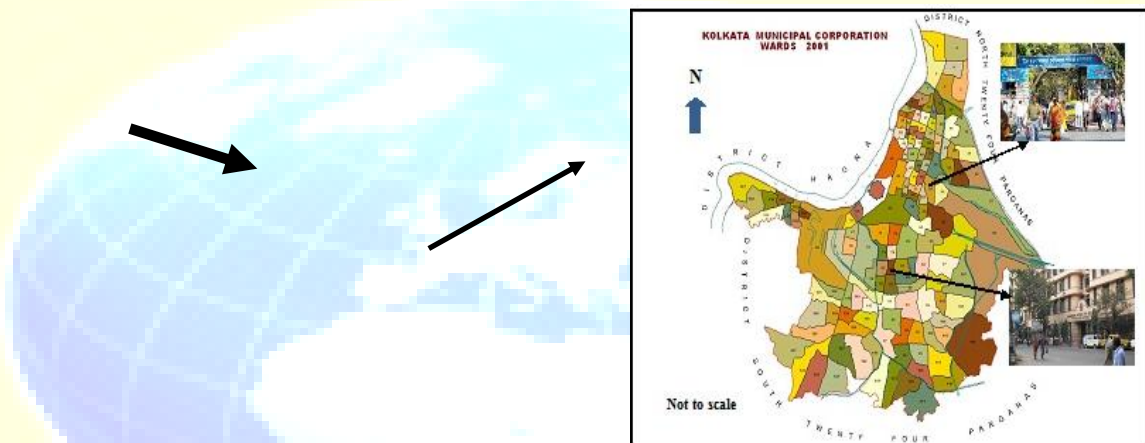


Figure 1: Images showing the location of the study area

Sources: Kolkata Municipal Corporation, website of maps of India,2013

Prevalence of Malaria in Nil Ratan Sarkar Medical College and Hospital: It is one of the major government city hospital situated in the Central part of the city attracting patients from various urban centers as well as rural areas of the districts. Every year a bulk of malaria affected people got admitted in the hospital among which male patients are recorded highest within the age group of 0 – 25 years. The age-sex combined comparison of 2010 and 2011 reveals that due to working in unhygienic conditions of the factories, industries, road and building constructed areas the male are getting more affected than female. The acquainted data also shows a year wise comparison of malaria affected patients which reveal the increasing number of plasmodium vivax affected male than plasmodium falciparum affected male. The Annual Blood Examination Rate (ABER) which is the most important parameter of malaria affected blood cell counting indicates the falling rate of malaria from 2009 to 2011 which is a good sign, and also other factors like Slide Positively Rate (SPR) Slide Falciparum Rate (SFR) , ‘Sen Factor’ disclose the

same situation. As far as the duration in the hospital and number of days of admission is concerned averagely patients are admitted for 6 – 9 days sometimes can be more than that depending on the severity of the disease. However supply of the antimalarial drug free of cost is considered as most important factor for the overburden situation of the hospital and simultaneously lower charge for investigation processes create severe pressure of patients in the hospital.

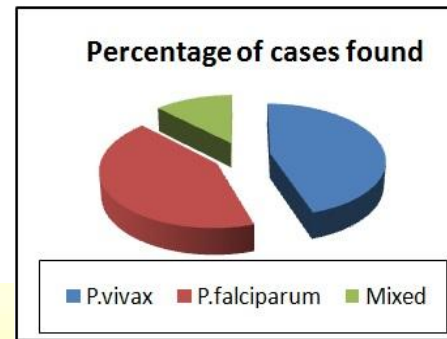


Figure 2: Diagram showing percentage of Malaria cases in N.R.S
Source: Primary survey,2013

Table 2: Table showing General Profile of Nilratan Sarkar Medical College and Hospital

Age – Sex Composition				Antibiotic Received		Duration in The Hospital		
Age Group	M	FM	M	FM	Name of antibiotic	% of Patients	No. of days	% of Patents
0-15	370	300	150	155	Ofloxocin	4%	1-3 days	28%
15-50	210	185	78	69	Cepodoxim	16%	3-6 days	56%
50-75	190	180	50	90	Amoxiclav	27%	6-9 days	18%
Above 75	95	73	25	28	Ceftriaoxone	83%	9-12 days	6%

Source: Weekly report format IPSD ,N.R.S.M.C.H,2013

Incidence of Malaria in Ramkrishna Mission Seva Pratisthan : City’s one of the influential private hospital under the Ramkrishna Mission Math and well known for its organized service provided to the patients. Facts are disclosed by the primary survey coupled with secondary that the malaria rate is high in this hospital and also in the borough which is mostly of mixed type, means both protozoa and virus are very reactive. Research work reveals unawareness, illiteracy, improper knowledge on health and hygiene conditions are the main causes for this mixed type cases. Ramkrishna Mission is famous for its well known treatment and due to this reason folk of people from various parts of the districts as well as city come to this hospital irrespective of socio economic background with some ray of hope. Data gathered from the record section exhibit due its powerful reactivity cepodoxim is mostly prescribed to the affected ones followed by ceftriaxone, amoxiclav which are generally supplied by the hospital itself. Though it is a

private hospital but the pressure of patient is similar that of government hospital due to which the patients are not admitted more than fifteen days. But overall situation of the hospital is quite satisfactory.

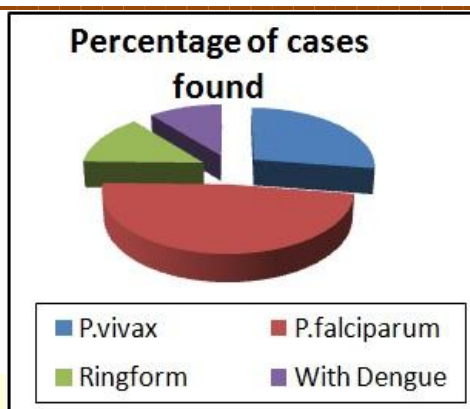


Figure 3: Diagram showing percentage of Malaria cases in R.M.S.P
Source: Primary survey,2013

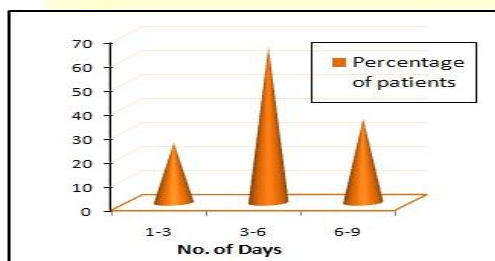


Figure 4: Diagram showing duration of admitted patients in R.M.S.P
Source: Primary survey,2013

Table No 3: Table showing Age-Sex Composition of Malaria affected patients of R.M.S.P

Age-Sex Composition				
Age group	2011		2010	
	Male	Female	Male	Female
0-30	21	12	18	13
30-60	15	8	7	9
60-90	5	5	3	2
Above 90		2	0	0

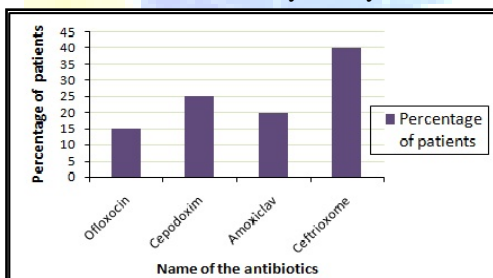


Figure 5: Diagram showing types of antibiotics received by the admitted patients in R.M.S.P
Source: Primary survey,2013

Source: Weekly report format IPSD,R.M.S.P,2013

Comparative Study of Malaria in Selected Boroughs of KMC : Malaria case detention and the anopheline larvae detention by KMC throughout 2011 were following similar upward trend with peak detention of anopheline larvae in monsoon and malaria cases in the post monsoon season. But the ABER (Annual Blood Examination Rate) shows the most disappointing picture, declining from considerably good figure of 10.6% in 2005 to 5.29% in 2011. The falciparum percentage (17%) of KMC area though declined to 8.91% in 2011 but yet to decline.

Though ABER is the most important indicator of counting of affected RBC but there are other factors like Slide Positivity Rate (SPR), Slide falciparum Rate (SfR) and a unit free composite indicator “Sen factor” (SF) to calculate or investigate the priority rating. $SF = [Pf\% \div SfR] \div ABER$

Annual Parasite Incidence (API) more than 1 considers Borough VI, VIII as malaria prone areas where the hospitals are situated. No ‘KMC malaria clinic’ in 10 wards due to geographical or technical reasons. There are six large densely populated wards which had two malaria clinics each. Borough VI, VIII falls under the overcrowded region that may be due to uncleanness which prone to severe illness. In these boroughs percentage of positive and reactive patients are high 68% NSI antigens positive cases of malaria are found and still KMC does not focus on cleanliness by spraying DDT, Gamaxin to control the breed.

In the selected hospitals though the common features of malaria incidence are found but there are some aspects which distinguish the situation of both the hospitals.

In N.R.S. Medical College and Hospital patients are coming from urban as well as rural part of the state whereas urban patients are mainly confined to Ramkrishna Mission Seva Prathisthan. The patients in this hospital are mainly from urban sectors of North and Central Kolkata due to their improper unhealthy living conditions in century old heritage buildings. Irrespective of socio-economic background a majority of population come to this hospital for better treatment but slum dwellers, people living in shanties, squatters are more affected than residents of newly constructed high-rises.

As the working place is also a determining factor for generating of this disease the lower income group, working day-night in unhygienic, unhealthy system are the worst sufferers. This leads to higher suffering of male population compare to that of female.

Table No 4: Table showing comparative statement of Malaria for KMC at a Glance (From 1st week of January, 2012 to Last week of December, 2012)

Borough	Slides Collected	Slides Examined	Antigen / Rapid Test	Positive	% of +ve	No of PV	% of PV	No of PF	% of PF	No Of Mixed	% of Mixed
Borough- I	12608	12608	0	1976	15.67	1861	94.18	114	5.77	1	0.05
Borough- II	24649	24649	0	3889	15.78	3532	90.82	352	9.05	5	0.13
Borough- III	24459	24459	0	3491	14.27	3365	96.39	117	3.35	9	0.26
Borough- IV	25651	25651	0	7263	28.31	5855	80.61	1298	17.87	110	1.51
Borough- V	25606	25606	0	6622	25.86	5677	85.73	934	14.10	11	0.17
Borough- VI	29198	29198	0	5658	19.38	5104	90.21	546	9.65	8	0.14
Borough- VII	34879	34879	0	6627	19.00	6443	97.22	181	2.73	3	0.05
Borough- VIII	19039	19039	0	3256	17.10	2937	90.20	315	9.67	4	0.12
Borough- IX	20419	20419	0	2040	9.99	1892	92.75	146	7.16	2	0.10
Borough- X	8705	8705	0	508	5.84	483	95.08	22	4.33	3	0.59
Borough- XI	1735	1735	0	35	2.02	34	97.14	1	2.86	0	0.00
Borough- XII	1911	1911	0	102	5.34	98	96.08	4	3.92	0	0.00
Borough- XIII	1932	1932	0	77	3.99	69	89.61	8	10.39	0	0.00
Borough- XIV	2903	2903	0	32	1.10	28	87.50	4	12.50	0	0.00
Borough- XV	3758	3758	0	66	1.76	64	96.97	2	3.03	0	0.00
TOTAL	237452	237452	0	41642	17.54	37442	89.91	4044	9.71	156	0.37

Source: Kolkata Municipal Corporation, 2013

Deleterious situation prevails within the Hospital: Poor sewage, stagnant water, open drains favor breeding of mosquitoes, main carrier of the malaria helps to complete their life cycle in a short span. Government hospital like Nil Ratan Sarkar Medical College is a good example of this condition. Sometimes source of the disease is hidden in the hospital campus itself due to negligence in the cleaning practices of hospital authority which ultimately come out as epidemic manner of malaria. But private hospital like Ramkrishna Mission Seva Pratisthan does not prevail such condition at all. It has maintained a good quality of hospital environment keeping in mind the goodwill of patients as well as working people in the hospital.

Prevention and controlling measures of the disease: It can be seen that according to the World Health Standard (WHO) the condition of city is quite dismal. Awareness on the part of government as well as common people is also essential to fight against with the situation. From 2010 – 2012 several anti-malarial initiatives are taken by the West Bengal Government.

- Listing of high risk areas.
- Joint drive for source reduction –

A weekly drive involving personnel of health departments and other departments of KMC such as water supply, building, drainage, sewerage, solid waste management.

- Distribution of Multi-colored leaflets for raising awareness among masses.
- Propaganda through TV and Radios.
- Organizing health camps adjacent to slum areas of the city.
- Publicity through auto branding like flex boards specifying do's and don'ts for prevention of malaria.
- Campaign using audio and video mobile vans.
- Distribution of multi-colored booklets among school children.
- Making mosquito control staff to render extra-hour service.
- Formation of rapid action team.
- Establishment of a mosquito research laboratory.
- Early diagnosis and complete treatment.
- Source elimination drive.
- Larvicidal spray.
- Fever surveillance
- Use of larvivorous fish like guppy fish (*Poecilia reticulata*).

Major findings –

- ✓ Nil Ratan Sarkar Medical College and Hospital being a government hospital and because of over burden of patients fail to provide proper treatment to the patients though majority comes each year to this hospital only.
- ✓ It has also failed to provide inefficient amount of medicine and beds to the patients.

- ✓ Being a private hospital Ramkrishna Mission Seva Prathistan try to give proper facilities but expenditure is high which a matter of concern.
- ✓ Overall scenario represents that the death rate has fallen from previous decades to present, due to awareness among people and using preventive measures by the people.
- ✓ The government policies also help to reduce the effectiveness of these diseases and to make the state free from epidemics.

Table no 5: Table showing SPR and number of deaths due to malaria

Year	Slide Positivity Rate (SPR)	Death due to Malaria
2001	4.3	191
2002	5	152
2003	5.5	214
2004	5.7	186
2005	4.2	175
2006	3	203
2007	1.9	96
2008	2	104
2009	2.7	74

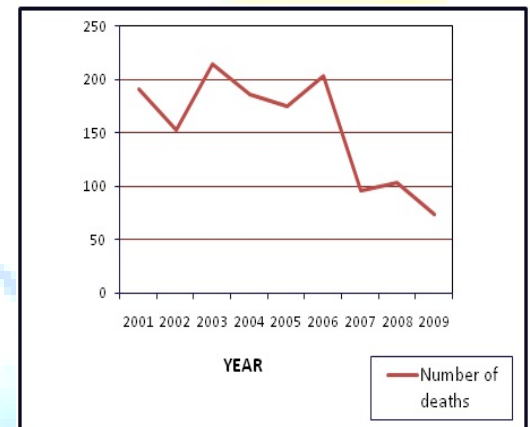


Figure no 6: Diagram showing Number of deaths due to malaria in West Bengal

Source: DDHS(MALARIA), West Bengal, 2012

Conclusion and Recommendation: Malaria is a biblical scourge to the people of Kolkata since 1690 till mid 1950s. Then with the implementation of National Malaria Eradication Program (NMEP) based on indoor residual spray with DDT, gave much relief. Unfortunately in mid 1970s, like any other part of the country, Kolkata too malaria swayed back. In 1980s it rose to 4.1% and in 1990s reached to 18.5%. In 1995, besides 18 other cities Kolkata too was declared as a high risk malaria city but KMC, health officials did not bother about it. Years passed but malaria clinics of KMC and government hospitals continued with Chloroquine resulting 318

people died of falciparum malaria in Kolkata during 1996 to 2010. KMC tried to obtain ACT (Artemisine Combined Therapy) but failed until National Guidelines for treatment of falciparum malaria introduced by the combined effort of Government of India and West Bengal which urged to ensure treatment of Pf cases with ACT at each level. As a result malaria scenario in Kolkata improved remarkably in 2011 and 2012. No death occurred hereafter 2010.

But to reduce the malaria cases and to eradicate it from our country several measures can be taken such as:

- Source reduction, filling ,streamlining water bodies
- Biological Control through species like Gambusia fishes, biolarvicides
- Spraying of D.D.T, gamaxin
- Reduction of SPR
- ABER of Kolkata needs to be improved by proper administrative planning
- Each borough should reach the target of 10% ABER by proper planning
- Campaigns through banner, poster, electronic media, print media to raise the awareness among the common mass

In comparison to that of the developed countries India is far away from removing the gene of this kind of disease due to lack of awareness among people, illiteracy, orthodox, superstitious believe, incomplete knowledge about malaria are roof causes hidden in the dearth of their mind which can only be removed by generating awareness among the common masses. The HDI parameter suggested by WHO includes life expectancy at birth and thus to reach satisfactory position improved health condition is absolutely essential. Tangible initiative to plan and implement strategies for mosquito control improvement of thread bare infrastructure will definitely act as weapons to fight against with this kind of fatal disease.

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