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Review article

A review on encumbrance of Malaria in Bangladesh

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Abstract

Malaria is a major cause of mortality and morbidity worldwide. It is a mosquito-borne disease caused by a protozoan parasite of the genus Plasmodium. As per the Centers for Disease Control, 216 million cases of malaria occurred around the world in 2016 and 445,000 people died due to malaria. This shows the significance, and the disease burden caused by malaria and the need for more awareness about this disease. In many malaria-endemic countries, these vectors also transmit other parasitic and viral disease. There are several measures done throughout the world to prevent and eradicate malaria. The number one reason for the comeback of malaria is the drug resistance. The citizens of each country have the right to receive evidence-based quality care. Many lives can be saved by diagnosing and treating malaria at its early stage. This article was a requirement for the Global health course, which was part of the Doctoral Nurse Practitioner program and was prepared by using literature review from PubMed, Cochrane library, CINAHL and other peer-reviewed article within the past five years. This article gives a brief review of the clinical significance of malaria in Bangladesh, the encumbrance of malaria on the citizens and the progress the country has made throughout these years. It also discusses the potential threat to the continued effectiveness of certain existing interventions, and the work in progress by the Centers for Disease Control on developing malaria vaccine. Developing an effective evaluation and reporting system in malaria-endemic countries, can help to gain better malaria control across the world.

Key words: Malaria, Bangladesh, parasitic

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1. Introduction

Malaria is a public health problem around the world, affecting 300 million people and responsible for about one million deaths annually. Africa accounts for 90% of the mortality burden of malaria and Southeast Asia accounts for nine percent of the burden. As per the report issued by the World Health Organization (WHO), on Nov 2017, there were 212 million malaria cases worldwide in 2015, with a 21%global decrease in malaria incidence between 2010 and 2015 and a 29% decrease in global malaria mortality rates between 2010 and 2015[10].

Bangladesh is one of the four malaria endemic countries in Southeast Asia, with more than ten million people at high risk.

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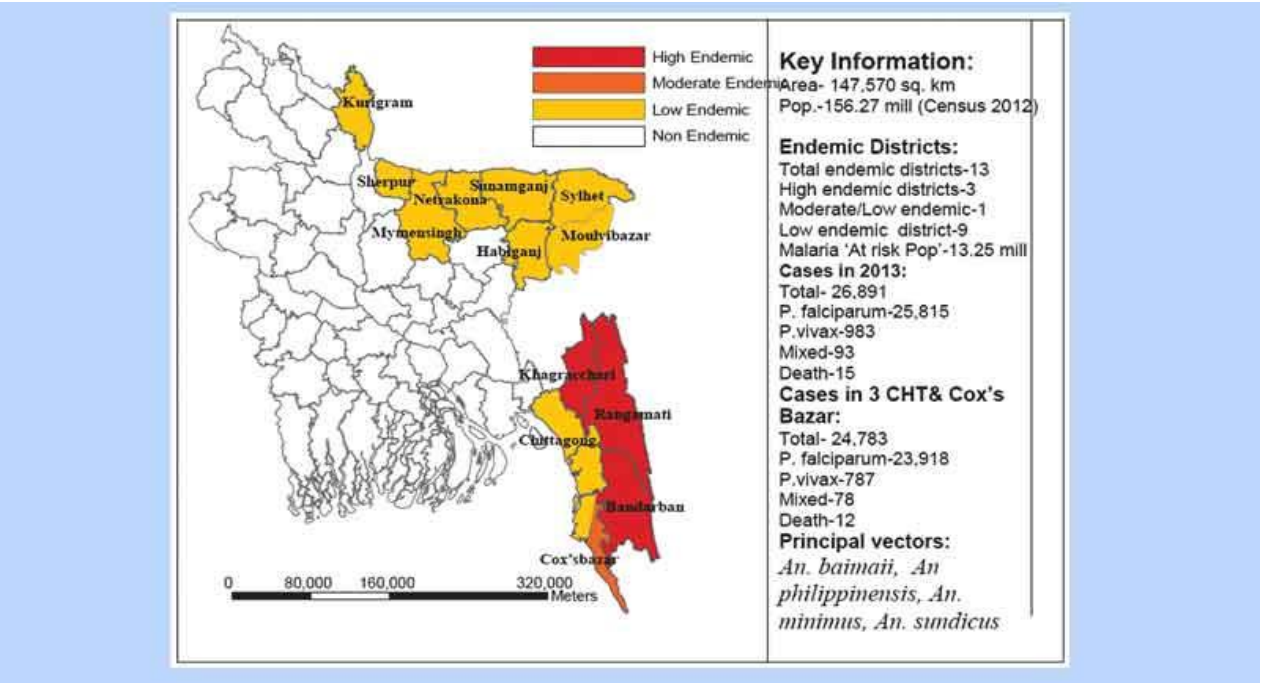
During the Malaria Eradication Program, in the 1970s, malaria was nearly eradicated from this country but never disappeared in the eastern regions which were associated with tea gardens and forests [7]. Malaria re-emerged as one of the major public health concerns in Bangladesh during the 1990s. It was mostly in the hilly and forested areas due to vector prevalence, geophysical condition, and climate. Malaria transmission is mostly seasonal and concentrated in the border regions of Bangladesh. Malaria is endemic in 13 of 64 districts of the country. The main three Chittagong Hill Tract (CHT) districts Rangamati, Khagrachari, and Banderban account for 80% of the total burden of malaria. About 14 million people are at risk in these CHT [7].

Bangladesh emerged as an independent nation on December 1971. It is in the middle of a deltaic plain, with a total land mass of 147,570 sq.km. The country has a total population of 152.5 million (Census, 2012) and a life expectancy at birth of 72.1 years.

It is one of the most densely populated countries in the world with a population density of 1,050 per sq. km (Global Health Observatory 2012) and an annual

population growth rate of 1.37% (SVRS 2011).

Bangladesh has a rich, diverse culture. Its deeply rooted heritage is thoroughly reflected in its architecture, dance, literature, music, painting, and clothing. The three primary religions in Bangladesh are Hinduism, Buddhism, and Islam, which has a great influence on its culture and history [2]. (Figure no 01)



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Bangladesh has a network of rivers and their tributaries. The country comprises of low, flat alluvial plains, canals, swamps and marshy lands. Hilly and forested areas cover about 8 percent of the land area in the east and north-eastern border region of the country. It has a tropical monsoon climate with seasonal floods, rainfall, tidal bores, cyclones, warm temperature, and humidity. The country is prone to natural disasters, such as floods, and deals with the consequence of these disasters almost every year. With global climate changes, this country is more likely to be affected, and this can increase the prevalence of all vector-borne diseases [10].

Malaria affects all age groups and both genders; however, adult males are commonly affected mainly due to their occupations and outdoor works. Pregnant women and children less than five years are also at higher risk due to the low level of immunity. The tribal hamlets that live in clusters in these remote hills and foothills are prone to malaria and hard to reach due to lack of communication. There are many reasons why malaria is so prominent in this region. Most of the house is "Kutcha house", which is built of wood, mud, straw and dry leaves and has no protection against the vector mosquitoes. There is an aggregation of laborers and sellers coming from plain areas for developmental work to the CHT districts. These people are non-immune to malaria and are at risk for malaria infection. Another group who are at risk is the Jhum cultivators, the forest goes and the refugees, due to lack of adequate protection from mosquito bites and adoption of personal protective measures. There are higher levels of malaria in border areas which may be due to migration to and from the endemic areas of the neighboring countries India and Myanmar.

Malaria is caused by the Plasmodium parasite. The parasite can be spread to humans through the bites of infected mosquitoes. There are five types of Plasmodium parasite which cause malaria in humans. These are Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae and Plasmodium knowlesi. In the South Asian region, Plasmodium vivax and Plasmodium falciparum are the predominant species causing human malaria and Plasmodium falciparum is responsible for most malaria deaths worldwide. Human immunity is an important factor in the transmission of malaria. Young children are most affected by malaria because adults develop partial immunity over years of exposure and reduce the risk.

There has been a significant reduction in the number of cases and deaths due to malaria over the last few years due to early diagnosis and treatment. Malaria microscopy and Rapid Detection test (RDT) are the main tools for diagnosis of malaria in Bangladesh. Microscopy is usually used in health facilities and RDT a finger prick test is used at the community level and in hospitals during odd hours. Use of RDT in a mass scale started in 2008 with the support of GFATM funding. Health workers and community workers

(ShayasthoShebika) of NGOs are responsible for diagnosis and treatment of uncomplicated malaria at the community level.

Community Clinic is the lowest level health facility for an average of 6,000 populations, to provide basic outdoor services for communicable and non-communicable diseases. These clinics consist of community health care provider (CHCP), health assistant (HA), and a family welfare assistant (FWA). There are additional microscopy centers established by a Non-government organization (NGO) consortium at the strategic location in the community. These centers provide an opportunity to fill up the gaps in diagnosis and treatment of malaria and increased accessibility of people in getting confirmed diagnosis and effective treatment. The medical officers working in the three hill tract districts, organize mobile clinics and other activities to provide RDT based diagnosis and treatment, in hard-to-reach areas [10].

Monitoring insecticide resistance in malaria vector is important for malaria control and elimination. The WHO global plan for insecticide resistance, management malaria vector (GPIRM) is an essential action plan to maintain the effectiveness of malaria vector control. This action plan was launched in May 2012, which included a five-pillar strategy to shape public, private and civil society's responsibility, and to safeguard past achievements and to address future challenges [10].

The malaria control strategies, mainly focusing on Plasmodium parasites or anopheles vector was shown to be effective in the past years. But, the emerging drug resistance parasite and insecticide resistance mosquito strains, along with environmental pollution, health, and ecological side effects, urged an alternative conventional and cost-effective method for malaria control. Biological control, including larvivores fish such as guppy, has shown more effective compared to chemical agents. Because of the nature of swamps and watersheds are the geographical characteristics of Bangladesh this strategy is more efficient, both cost and environmentally wise. By the help of local and regional health centers, they can open "Guppy fish bank" where villagers can come to collect guppy fish. Releasing these guppy fish to the watersheds can reduce the larvae production significantly.

The article "An epidemiological overview of malaria in Bangladesh" published on the travel medicine and infectious disease provides an overview of the malaria situation in Bangladesh. It states that low socio-economic condition, poor schooling and close proximity to water bodies and forest areas comprise the risk factor for malaria. The article also discussed the major malaria parasite prevalent in Bangladesh, seasonality of malaria, diagnostic method, and drugs used in malaria. It mentioned that evidence of resistance to antimalarial drugs has been reported in Bangladesh since 1970. The study revealed that only two third people who have malaria seek treatment and the many who consulted doctors went to unqualified village doctors. People also try to self-medicate from the private sectors. A major challenge in malaria control is extending the support programs to remote areas. The community-based approach has seen to be very effective in reducing malaria in many countries like Ghana and Ethiopia. Incorporating such practice in Bangladesh will be significant in reducing malaria [7].

Another article "The origin of antimalarial drug resistance" published on the New England Journal of Medicine state that although the use of antimalarial drugs has a long history the emergence of drug-resistant is a recent phenomenon. The first chloroquine resistance malaria appeared in Thailand in 1957. To combat resistant strains, synthetic antimalarial drugs were deployed which was expensive and thus less available to the general public. Mass drug administration programs in the world during the 1950s and 1960s also contributed to drug resistance. Although the drugs have changed the social and economic condition under which they are used has not changed. An intensive campaign is currently underway to eliminate artemisinin resistance and to prevent its further spread. These efforts focus on identifying and treating all cases of malaria in the region. It is important to address the social and economic conditions that contribute to the spread of malaria and foster antimalarial resistance. Stopping or regulating the marketing of monotherapies and counterfeit drugs, are essential steps for preventing artemisinin-based drugs from following the path of chloroquine [8].

The article "The threat of antimalarial drug resistance" published in the Tropical Disease, Travel Medicine and Vaccines, discuss the cost of drug-resistant malaria in human life. It states that even though malaria has existed for several thousand years, it is still a major health problem. It states that the drug resistance is due to the misuse of antimalarial drugs such as in the form of a medicated salt, high frequency of wrong dosing, use of monotherapy and the widespread use of low-quality medication in poor countries. Further, increasing number of travelers who are less immune to malaria can also facilitate the spread of resistance parasite. Lower level immunity and higher parasite burdens in this country, increase the probability that drug resistance mutants will survive. Even though there are several new medications in the pipeline, it will more likely take a decade before it would be available for use. So, the containment plan should focus on existing medication. The article concludes by stating new drugs and new strategies are urgently needed to battle drug resistance malaria [4].

The study 'Malaria burden and control in Bangladesh and prospects for elimination: an epidemiological and economic assessment' is a study of epidemiological and economic assessment of malaria control in Bangladesh. The study was done for a period of four years. The researchers found that there was a decrease in malaria from 2008 to 2012. Districts with more than 0·5 insecticide-treated nets per person had a decrease in the

prevalence of 21% for all malaria. Prevalence of all malaria decreased by 65% and malaria-associated mortality decreased by 91% by 2012 compared to 2008. By 2012, there was one insecticide-treated net for every 2·6 individuals. Malaria control in Bangladesh depends on a donation from other countries. The benefit of the malaria eradication program in Bangladesh will also help internationally, by helping us to design strategies and programs in other malaria-endemic countries [5].

Progress made in the control of malaria during past years has prompted global dialogue on malaria elimination and eradication. the article "Tools and Strategies for Malaria Control and Elimination: What Do We Need to Achieve a Grand Convergence in Malaria?" published on March 2016 mentions the development of new drugs, vaccines, and vector control products. As there will be a reduction of malaria transmission, there will be an increase of malaria in the clustered population such as forest workers and migrant workers. This will help in increasing the surveillance and tracking of the disease. The current drug regimen is that the medication treatment is taken over three days and usually the compliance is poor. Vigilance for the emergence and spread of drug resistance parasite and declining treatment efficacy is crucial [6].

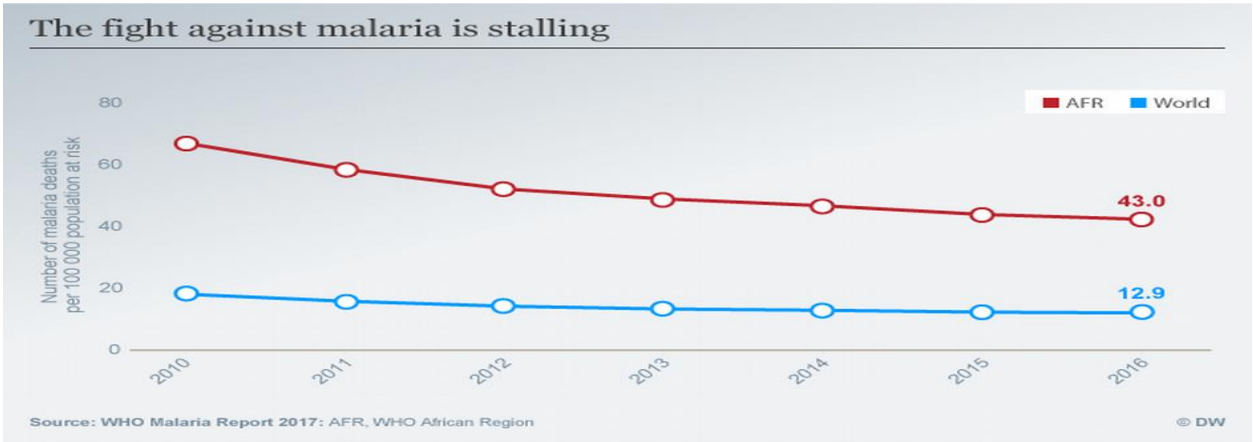

Figure no: 02

Goals to help prevention

Short term goals of malaria control are by vector control and health education. Vector control is the main way to prevent and reduce malaria transmission. For this we need to identify the influential leaders in the community and involve them in our campaign. The key personnel within the country will be the religious leaders and the local politicians. Heath education and campaigns can be done at the local government offices or the churches and mosque halls after the worship. There should be also health education done at antenatal clinics regarding malaria, since pregnant women are among the high-risk population. Teaching with the use of audio-visual media like documentaries will be helpful. People who are illiterate or do not know how to read will benefit with videos or pictures. Billboards in the communities will have instructions with more pictures. Health education at the clinics and regional centers can be done by nursing students with the collaboration of nursing schools.

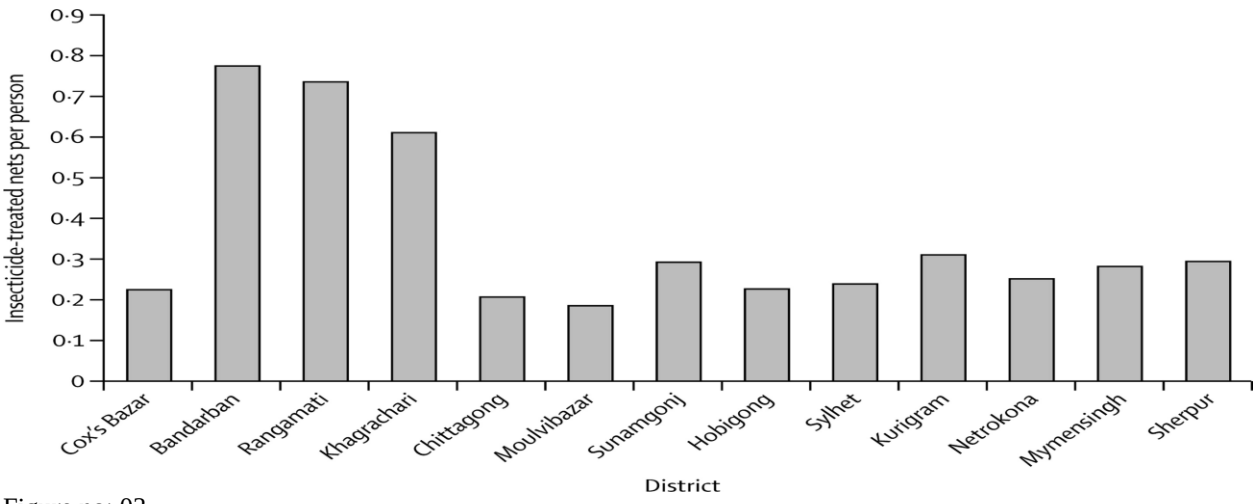

Figure no: 03

Providing long lasting insecticide nets (LLIN) to every household is another way to reduce malaria and encourage them to use the LLIN. This distribution can be done by a mass campaign in the antenatal clinic. We can also reach out to the population in the hilly area through mobile vans. Initiating a Guppy program through regional centers will be beneficial for vector control. Skill training can be done at local level with having group leaders. Teaching can be done for volunteer workers, on how to perform RDT and start the initial treatment for malaria. Health education regarding malaria should start at school levels. Teaching the importance of medication compliance and the use of protective clothing should be emphasized.

Long-term goal is to support the poor or developing countries in the process to eliminate Malaria and to have a better Malaria surveillance system. Malaria surveillance is the systematic and regular collection of information on the occurrence, distribution and trends of malaria with sufficient accuracy and completeness to inform decision-making. Monitoring and evaluating countries surveillance system is important to ensure that the surveillance system follows national malaria control or elimination priorities [11]. Malaria surveillance activities should be adequately budgeted and resourced to enable the effective implementation of case notification and investigation activities. Declining donor funding and competing health priorities threaten the sustainability of malaria programs. Elucidating the cost and benefits of continued investments in malaria could encourage sustained political and financial commitments. More researchers and funding are needed in the development of drugs and vaccines to treat and prevent malaria. The focus should be reducing the rate of malaria in the hilly area. Better surveillance method such as tablets or mobile devices to document the disease will help us to track the disease simpler. Directly observed therapy with one-time dose of medication, for the treatment of malaria is another way to control malaria. Early detection and treatment will help to prevent the spread of malaria [11].The government should control and regulate the private drug companies since there are plenty of counterfeit drugs available to public. Frequent inspection should be done from governmental agencies to prevent providing low quality medications to public.

Poverty, inequality, and social determinants of health not only contribute to global health issues but can also adversely impact morbidity, mortality, and health outcomes [9]. As Global health issues (GHIs) require global cooperation in response, planning, prevention, preparedness, and care that reflects health equity issues among nations. These issues require complex inter professional and interagency cooperation and solutions that involve governments, non-profits, and many times include private companies and foundations [3].WHO has rolled out The Global vector control response 2017–2030 (GVCR) which provides a new strategy to strengthen vector control worldwide through increased capacity, improved surveillance, better coordination and integrated action across sectors and diseases [10]. Total funding for malaria control and elimination reached an estimated US$ 2.7 billion in 2016. Contributions from the governments of endemic countries amounted to US$ 800 million, representing 31% of funding.

DNP essential

The DNP essentials I chose were the Health Care Policy for Advocacy in Health Care and Clinical Prevention and Population Health for Improving the Nation's health [1]. As doctoral nurses, we are well positioned to assess our communities and populations and to advocate for justice and equality. We can also partner with legislators and inter-professional leaders identify, implement, and evaluate a "strength-based approach" that engages communities addressing local, national and global health issues. We can engage with all levels of health workers, including nurses, physicians and other members of the healthcare. We can disseminate the importance of prevention of infectious disease upward and downward within our organization. When more people reach out and impact the community, the louder will be the message delivered [3]. We can actively participate in communities and get involved in policy making and be the voice for the underserved communities. We can support and participate the activities of WHO like Mass drug administration (MDA) which consists of the administration of a full therapeutic course of antimalarial medicine, irrespective of the presence of symptoms or infection, to a defined population living in a defined geographical area at approximately the same time and often repeated at intervals [10]. As nurse leaders, together we can organize and implement programs and strategies, which are evidence-based, to eradicate Malaria from Bangladesh.

This project was done as a requirement for global health and social justice course at Dominican College, Orangeburg, New York. The course examines major global health challenges, programs and policies and students were introduced to the world's vast diversity of determinants of health and disease. It also analyzed current and emerging global health priorities, including emerging infectious diseases, poverty, conflicts and emergencies, health inequity, health system reforms, and major global initiatives for disease prevention and health promotion. No funding was used from any social or political organization.

Conclusion

The dream of eliminating malaria from many parts of the world pursued vigorously during the 1950s and 1960s. This faded because of the spread of drug and insecticide resistance and fewer tools to control malaria. More

research needs to be done to eradicate Malaria from the world. The research can only be done by more donors to fund the programs. We need to create public awareness regarding malaria transmission and the treatment and the prevention measures in place. Together we can build a malaria-free world.

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