

Visceral Leishmaniasis Elimination Program in**Bangladesh and Achieving Millennium Development Goal****ABSTRACT**

Aims: The aim of this review is to present the status of Visceral Leishmaniasis (VL) in Bangladesh and various steps taken to achieve the Millennium Development Goal. Additionally, the review covers the related challenges and opportunities to achieve this goal.

Main Body: Currently, 45 out of 64 districts of the country are endemic for VL and 20 million people, around 18% of the total population, are considered to be at risk for VL. However, there is a concern about the number of this reported case. It has been mentioned that the number of cases reported in surveillance data is likely to be at least five times underestimated. The current burden of VL disease is 23.4 times higher than the elimination target of 1 case per 10,000 populations in 2015. However, the number of reported VL cases decreased gradually in Bangladesh. Various national strategies have been taken so far to eliminate VL from Bangladesh. Government of Bangladesh constituted a national steering committee and formed a technical working group to provide support to VL elimination program. However, lack of trained and efficient labour force and lack of knowledge among the people are big challenges for VL elimination in Bangladesh. In addition there are other problems such as drug unavailability, unfriendly behaviour of health worker and existence of unofficial payment in public hospital patient. A major challenge towards VL elimination is the rising incidence of Post kala azar dermal Leishmaniasis. However, oral therapy with miltefosine and rapid diagnostic with rk39 has been introduced in Bangladesh.

Conclusion: From the public health view and guided by research evidence it seems the elimination of VL from Bangladesh is technically feasible and operationally possible. Some of the major challenges can be overcome with adequate training and ensuring sufficient health workers, providing more resource to this neglected disease and introducing demand side financing through health voucher program.

Keywords: Visceral Leishmaniasis, Millennium Development Goa, Bangladesh.

INTRODUCTION

Visceral Leishmaniasis (VL) is a serious public health concern with an estimated 200 million people at risk for infection in Indian subcontinent [1]. Approximately 25,000 to 40,000 people are infected and 200-300 die every year in Bangladesh, India and Nepal, comprising 60% of the global burden of VL [1-3]. The global burden estimate for Visceral leishmaniasis (VL) is 0.5 and 2.5 million incident and prevalent cases per year, respectively [4]. In Bangladesh the VL disease is known as 'Kala azar'. A total of 73,467 kala azar cases during 1994 and 2004 were reported by Government of Bangladesh [5]. However, this information was based on hospital utilization and thus was believed to be underestimated.

In Bangladesh, *Leishmania donovani* is the only species causing VL, the female sand fly *Phlebotomus argentipes* is the only vector and humans are the only reservoir [1,5]. These unique characteristics and recent advances in rapid field based diagnostics and availability of effective and safe oral drugs makes the disease a target for elimination. The elimination of this disease is important in order to achieve sustained economic development as VL mostly affects the poorest of the poor people residing in rural areas [2]. As a part of its millennium development goals (MDG), World Health Organization (WHO) declared to combat HIV/AIDS, malaria and other diseases (MDG 6). As a result WHO targeted to decrease the incidence of VL below 1 case per 10,000 populations by 2015. Consequently, a memorandum of understanding was signed among the ministry of Bangladesh and WHO declaring a commitment to decrease the incidence of VL at the MDG targeted level [2]. The VL control strategies focus on the physical and chemical barriers to the vector of the disease and early case detection and treatment. It targets to epidemiological entities of VL where humans and animals are the reservoirs for infection. The options available for VL control are indoor residual spraying (IRS), long lasting insecticidal nets (LLINs), environmental management (EVM), early detection and treatment. So far, government of Bangladesh has taken various steps and implemented various programs to eliminate VL from the country. The present study will review the present status of VL in Bangladesh, the various steps taken to achieve the MDG and related challenges and opportunities to

achieve this goal. The findings of this study will help to design evidence based policy that motivates to implement programs targeting MDG.

1. HEALTH CARE SYSTEM AND HEALTH POLICY IN BANGLADESH

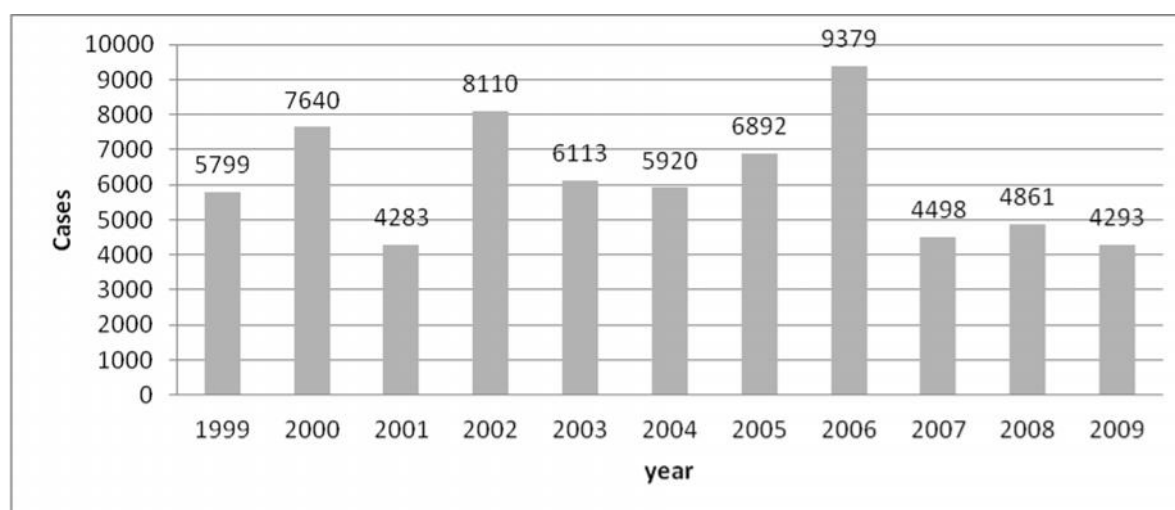
Bangladesh is located in South Asia with an area of 147,570 kilometers. The country has 146 million populations with a density of 990/square kilometers (Ministry of Finance 2010). The country is an agricultural based economy with 72% of its population living in the rural areas. Per capita GNI and GDP are USD 750 and USD 686 respectively [6]. Nearly half of the population lives below the poverty line and 36% of the total population has an income of less than one dollar per day. Total health expenditure (THE) is 3.4% of GDP. Out of the THE, government expenditure is only 26% and the household or out of pocket expenditure is 64% [7].

The health sector of Bangladesh remains under the direct authority of the government as this sector has to achieve a number of social objectives for enhancing development. The constitutional commitment of the Government of Bangladesh is to provide basic health and medical requirements to all people in the society [8]. The government's policy objectives in the health care sector are to provide a minimum level of health care services for all, primarily through the construction of health facilities in rural areas and the training of health care workers. Government health care facilities in rural areas consist of subdistrict health centre i.e. Upazilla Health Complex (UHC), union-level health and family welfare centre i.e. sub centre (SC) and Union Health and Family Welfare Centre (UHFWC), and rural dispensaries. The UHFWC or SC provide the first contact between the people and the health care system and is the nucleus of primary health care delivery. District hospitals and some infectious-disease and specialized hospitals constituted the second level of referral for health care. Medical college hospitals and postgraduate specialized institutes with attached hospitals constituted the third level of health care. At all cases, the services are free at the point of delivery and some drugs are provided free of cost [9].

2. VL BURDEN IN BANGLADESH

VL was first reported in 1824 in Jessor district of Bangladesh. As per report, an endemic occurred in 1824-27 caused 75,000 deaths [10]. However, VL has developed epidemic cycles taking place every 15-20 years [11]. Currently, 45 out of 64 districts of the country are endemic for VL and 20 million people, around 18% of the total population, are considered to be at risk for VL [12]. Nearly 54% of the cases are from one district, namely Mymensingh, and 25% cases are account from three more districts. On average 10,000 cases are detected annually in facility based surveillance. The reported number of VL cases per year from 1999 to 2009 is shown in figure below.

Figure 1: Number of VL reported cases in Bangladesh during 1999 and 2009



Source: Director General of health services (DGHS), Dhaka

Figure 1 shows that the number of reported VL cases decreased gradually in Bangladesh. However there is a concern about the number of this reported case. It has been mentioned that the number of cases reported in surveillance data is likely to be at least 5 times underestimated [5]. The issue of under reporting has also been mentioned in some other articles [1, 13, 14]. The number of cases reported by the program is mostly based on passive surveillance system. Accordingly the true burden of VL disease in Bangladesh is far greater than the reported cases as many cases remain under-reported.

Though there is a concern about the validity and reliability of this data, apart from this DGHS data no complete, consistent and year by year information on VL incidence in country is available in

the literature. Various sporadic research studies done in the country is the only source of such incidence data. Again most of these researches have been done in VL endemic areas of the country and thus the findings are reported based on this geographical based data. Rahman *et al* (2010) mentioned that the annual VL incidence was 28, 85 and 46 cases per 10,000 populations in 2002, 2004 and 2007. Mondal *et al* (2009) reported that in 2008 the incidence of VL in Rajshahi district were 27 per 10,000 populations. Rahman *et al* (2010) mentioned that in Fulbaria, sub district of Mymensingh district, the annual VL incidence in 2006 was more than 80 cases per 10,000 populations. Using data collected in 2009, Singh *et al* (2011) mentioned that the VL incidence was 23.4 per 10,000 in Bangladesh. Hrive *et al* (2010) estimated that the VL incidence was around 109 per 10,000 populations. Table 1 summarizes the incidence of VL patient measured by various literature stated above.

Table 1: Incidence of VL cases reported from various studies

Year	Reference location	VL incidence (per 10,000)	Reference
2002	Country	28	Rahman <i>et al.</i> 2010
2004	Country	85	Rahman <i>et al.</i> 2010
2007	Country	46	Rahman <i>et al.</i> 2010
2008	District, Rajshahi	27	Mondal <i>et al.</i> 2009
2008	Upzilla, Fulbaria	>80	Rahman <i>et al.</i> 2010
2008	District, Mymensingh	109.4	Hrive <i>et al.</i> 2010
2009	District, Mymensingh	23.4	Singh <i>et al.</i> 2010

Considering the latest available information in the literature, the current burden of VL disease (23.4 cases / 10,000 populations) is 23.4 times higher than the elimination target of 1 case per 10,000 populations in 2015.

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127 3. NATIONAL STRATEGIES TO ADDRESS MDG

128 Various national strategies have been taken so far to eliminate VL from Bangladesh. Some of the
129 most important strategies are mentioned below. A regional technical advisory group was established
130 and the ministries of Bangladesh, India and Nepal signed a memorandum of understanding to
131 enhance their country and cross country collaboration [15]. The five pillars of the VL elimination
132 strategy have been identified - ensuring access to early diagnostic and complete treatment, effective
133 disease surveillance, integrated vector management and vector surveillance, social mobilization and
134 building partnership and implementation research [1,16].

135 Government of Bangladesh constituted a national steering committee and formed a technical
136 working group to provide support to VL elimination program. A strategic plan and district level
137 operation plan have been developed in 2005. Consequently, a national guideline, a training module,
138 diagnostic procedure module and a booklet for health workers have been developed (Ministry of
139 Health and Family Welfare 2010b). Various significant steps have been taken to eliminate the VL in
140 Bangladesh. A sensitive diagnostic tool, namely 'rk39' has been recommended for screening process.
141 In addition, miltefosine, the most effective and reasonably safe oral drug for VL treatment, has been
142 registered in 2008 for use in Bangladesh [17]. Surveillance through passive case detection is done by
143 government institution. Various materials such as patient registers, treatment cards, laboratory
144 registers, and patient referral forms have been developed [18]. Efforts have also been taken to
145 develop new diagnostic tool, namely rk28 [17].

146 Government of Bangladesh has developed partnership with several organizations such as
147 World Bank, UNICEF, DFID, GTZ, Bill and Melinda Gates Foundation, JICA, USAID and WHO TDR
148 to promote basic and implementation research on drug and diagnostic [12]. Various operation
149 researches have been initiated. For instance, disease and economic burden studies, mapping of the
150 disease using geographical information system (GIS), entomological spot checks and cost
151 effectiveness of various methods of identifying VL patient have carried out as preparatory activities
152 [1,2,17].

153

154 **4. CHALLENGES TO ACHIEVE MDG**

155 There are several constraints in the health system and these challenges have still to be overcome in
156 order to achieve MDG. Some of the challenges are stated below:

157 *Non availability of complete data:* There are limited sound data about the VL incidence in the country
158 and incomplete and partial information about people's access and use of health care seeking [1]. The
159 wide gap between the number of reported and estimated cases constrains planning of elimination
160 [17].

161

162 *Supply side barrier:* Due to drug unavailability, unfriendly behaviour of health worker and existence of
163 unofficial payment in public hospital patient often seek treatment from informal sector who provide
164 expensive, incomplete or inappropriate treatment that favors continued transmission of the disease
165 [2]. In addition, delays between onset of symptoms and diagnosis, high non adherence to treatment in
166 the under-served districts may affect achieving the targeted goal ([20]. Lack of trained and efficient
167 labor force is a big challenge for VL elimination in Bangladesh. For instance, after a decade pause,
168 Bangladesh has recently initiated the indoor residual spray (IRS) as vector control program for control
169 and elimination of VL. Several shortcomings have been identified during the program such as lack of
170 training of spraying squad and supervisors, deficient spray equipment, poor spraying performance,
171 lack of protective clothing and poor disposal of left over insecticides [21]. The mobilization of financial
172 and human resources and its allocation until recently is low [1]. Ensuring timely procurement of
173 quality drugs, diagnosis, insecticides and spraying machines is a major concern of the elimination
174 program.

175 *The rising incidence of Post kala azar dermal leishmaniasis (PKDL):* A major challenge towards VL
176 elimination is the rising incidence of PKDL which occurs after the VL treatment and act as an infection
177 reservoir threatens the VL elimination initiative. These patients are difficult to diagnosis and treat, as
178 some of them may not have even post history of VL [12]. However, without better treatment of these
179 PKDL patients the MDG is unlikely to be achieved. A cost effective diagnostic tool to facilitate

community based PKDL cases detection, along with shorter course treatment schedule, is need to be develop [20].

Lack of knowledge among the people: Development and implementation of behavioral change and communication is important as people's knowledge of the disease is very poor. Only 21% of the people in the VL affected area are aware of sand fly involvement in transmission [15].

5. OPPORTUNITIES TO OVERCOME CHALLENGES

Even though existing of several challenges, there are copious reasons and clear ground for optimism. Over the last years, significance progresses have been made developing several diagnostic tools and alternative treatments. Among these, oral therapy with miltefosine and rapid diagnostic with rk39 has lead to Bangladesh along with other countries of Indian subcontinent initiative to eliminate VL by year 2015.

The VL elimination program is possible in Bangladesh because of its unique epidemiological features. The favoring factors are that: human beings are the only reservoir host; *Phlebotomus argentipes* is the only vector [1] and 80% of the VL cases are from only 4 districts of the country [5]. The high political motivation and commitment by government of Bangladesh is a positive step on elimination of the VL disease. Collaboration with different development partners and improvement partnership at national level with different stakeholder is the strength of the VL elimination initiative.

Government of Bangladesh has introduced demand side financing thorough health voucher program for maternal delivery. The program has successfully reduced the maternal mortality and government is now working on to scale up this program in the country [22]. Taking the experience of this maternal health voucher program, various demand side financing mechanism both in cash (e.g. providing voucher) or kind (e.g. providing bed nets) can be introduced.

6. CONCLUSION

From the public health view and guided by research evidence it seems the elimination of VL from Bangladesh is technically feasible and operationally possible. However, achieving the target to eliminate VL from Bangladesh will be extremely challenging. Some of the major challenges can be

208 overcome with adequate training, ensuring sufficient health workers, time and resources for planning
209 and strengthening referral services. Bangladesh needs to adapt active case detection strategies,
210 expand the indoor residual spray and long lasting insecticide treated nets program. The evidence
211 based policy should be designed to create public awareness and develop personnel behavior to
212 control VL.

213 The cost of VL treatment is expensive and thus may lead to catastrophic health expenditure
214 for majority of the households [2]. The coping strategies that families adapt may diminish the assets
215 and push the family to fall into debt thus can lead the families into impoverishment. Thus VL
216 elimination program need to think about cost effective methods considering patient perspective
217 ensuring easy and free of charge access to the health facilities, diagnosis and related treatment. A
218 partnership between government facilities and non government organization (NGO) can be an option
219 to provide treatment and introducing health voucher for the VL patient. Finally, improvement of
220 access to diagnosis, strong integration of early diagnosis and treatment into the existing health
221 services along with investment of resources into transmission control may lead to eliminate the VL
222 from Bangladesh thus help to achieve the MDG.

223 224 **CONSENT**

225
226 Not applicable.

227 228 **ETHICAL APPROVAL**

229
230 Not applicable.

231 232 **COMPETING INTEREST**

233
234 Authors have declared that no competing of interest exists.

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