

Climate change influences disease pattern

All out effort needed to contain dengue

MD. ASADULLAH KHAN

HEAVING seas, scorching summers, dying forests and watery end to the coastal cities are some of the penalties people around the globe have to pay, scientists believe, for failing to do something about global warming.

A warming climate that brings in its wake widespread ecological changes may bring about wide-scale changes in disease patterns. According to Epstein climate change could have an impact on health in three major ways: by (i) creating conditions conducive to outbreaks of infectious diseases; (ii) increasing the potential for transmission of vector borne disease; (iii) hindering the future control of disease. There are indications, that this disturbing change has already begun.

Now a vector-borne disease is one in which the pathogenic micro-organism is transmitted from an infected individual to another individual by an anthropolod or other agent, sometimes with other animals serving as intermediary hosts. The transmission depends upon the attributes of three living organisms: the pathogenic agent, either a virus, protozoa, bacteria or helminth (worm), the vectors which are commonly anthropolods such as ticks or mosquitoes, and the human host. In addition, intermediary hosts, such as domesticated and or wild animals often serve as the reservoir for the pathogen until susceptible human populations are exposed.

Nearly half of the world's population is infected by vector-borne diseases, resulting in high morbidity and mortality. The distribution of the incidence of vector borne disease ranges with its overwhelming impact in developing countries located in tropical and subtropical areas. Weather affects vector population dynamics and disease transmission with temperature and humidity as key variables.

Dengue or backbone fever which had essentially disappeared in the Western Hemisphere, has now reappeared in America infecting over 200,000 people in 1995. Meanwhile, scientists using computers to simulate the general circulation of the earth's climate have predicted that rising global temperatures will increase the potential transmission of the dengue fever virus. Dengue fever is now considered the most widespread viral infection transmitted in man by insects, whether measured in terms of the number of human infections or the number of deaths. Most of the areas of increased potential risk were predicted to be temperate

regions that currently border on endemic zones. These fringe areas represent places where humans and the primary carrier, the mosquito "Aedes aegypti" often coexist but where lower temperatures now limit disease transmission. Jonathan Patz, lead author and Medical researcher from the Johns Hopkins School of public Health said, "since inhabitants of these border regions would lack immunity from past exposures, dengue fever transmission among these new populations could be extensive". Unlike the yellow fever virus carried by the same mosquito the dengue virus is not vulnerable to any vaccine or drug. Major epidemics of dengue devastated Texas region in the U.S. in 1922 in which 500,000 people were stricken during an unseasonably hot year.

Precisely speaking, climate conditions may contribute to the

about 2363 persons including adults and children hospitalised in different hospitals and clinics of Dhaka city till August 18 (Source The Daily Star), two doctors, one of them Dr. Nabila, a young medical practitioner fell victim to this dreaded disease within three days of attack in Bangladesh Medical College Hospital in the Dhaka city. Experts opine that Dr. Nabila's infection was probably caused by mosquito biting infection from the patients she was handling in the hospital. Like Dr. Nabila, more and more people from all walks of life in Dhaka city including those in posh localities have been stricken by the disease. Dhaka is close to being what is popularly called, a hot zone: ground zero in an epidemic. Alarmingly, with outbreaks almost every year, since 1999 dengue's strike has left Dhaka shaken. Among vector borne diseases, dengue is second only to Malaria in

humans and decrease the probability of dengue transmission. After the '70s, a time when many diseases were believed conquered, several factors have conspired to make our country a nursery of microbes : a dangerous complacency arising from the worldwide eradication of smallpox in 1980, the misuse of antibiotics ,major alteration and interventions in the country's environment, population explosion, growing urbanisation, a general breakdown in sanitation facilities, and most prominently the lack of surveillance network for new diseases. Though the range of microbes causing these diseases is frighteningly large, more than half the deaths in the country are from infectious diseases that can be prevented. Unhappily, parasites are learning to build molecular defences against drugs. It is not just the microbe that gets resistant, the

tant and essential to fight this scourge on a war-footing as National Professor of Medicine Dr. Nurul Islam has pointed out in the "Prothom Alo" on August 11. Other than taking up mosquito control programmes by spraying larvicide or pesticides or predator fish species in still water in drains and ditches, DCC and Health Ministry in participation with residents must go for community elimination of aquatic breeding sites and ask residents to use window screens and other personal protective measures. Technological and administrative control must be geared up in achieving improved and expanded surveillance network along with education initiatives for healthcare providers, behavioural controls, proper clothing for children while at home and school and use of repellents and taking adequate prophylactic measures when travelling from one place to another inside the country or abroad. Dhaka's dengue outbreak could have been at least reduced in intensity if the mosquito population was checked by adaptive measures and environmental control.

It's worth noting here that after a grisly brush with plague known as black death in 1995, Surat fought the scourge with a sanitary revolution. Much like the pied piper of Hamlyn, this time the pied piper was S. R. Rao, an IAS officer who was appointed Municipal Commissioner of Surat. Rao cleaned up slums, clogged streets and pulled down illegal buildings to widen roads and ran a sanitation department that became a model for others. Rao declared after taking over charge, "If people lacked civic sense, the corporation would set the standard." Citizens were astonished to see the municipal top brass ankle-deep in a garbage dump, helping sanitation workers shovel the filth.

Dhaka City Corporation Mayor Sadek Hossain Khoka inherits a daunting legacy. With thousands of demoralised corporation staff and workers never confronting such a delicate situation, the Mayor has to rise to the occasion. The Mayor has to electrify the insular machinery, awaken the corporation workers to do their job and inspire the ward commissioners to address the problems of the city dwellers in the respective wards.

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From energy gap to energy crisis

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IT is now evident that the public sector exploratory drilling activities has continued to slide down the scale in recent years in Bangladesh. But the government seem to ignore this vital issue, rather perhaps wish that contracts with the international oil companies will do it all and Petrobangla may relax for a while. Such a notion will create increasing national concern over the desired implementation of the National Energy Policy, 1995. Indeed, we also seem to be ignoring that the pioneering assignment of the energy policy was to answer atleast three basic questions: "How much energy do we need?" "Where are we going to get it?" "What changes in government policies or economic conditions would enhance our national energy posture?" "Translated from a knowledgeable Bangladeshi, the third question meant: "What should government do or do not do to assure adequate energy supply?" According to a recent study the country would need about US\$ half a billion worth of investment in the gas sector alone by 2010 to find more gas in the country. This large chunk of money reportedly will be needed under the 6 per cent growth rate. Referring to the national gas utilization committee, UNB reported that since the country will not be able to secure such huge sum of money, it would be necessary to seek foreign direct investment (FDI). But even UNB appears to be unwilling to invest further although it received almost a gift like Jalalabdd gas field. The company reaction came after Petrobangla wanted to get gas supply from the Maulvibazar gas field. Incidentally, Maulvibazar field has not been appraised nor has its reserve been certified as per standard gas field practice. The nation's plight is, quite simply, the plight of its investment and new find. What the government perhaps do not realise is that even to sustain a business as usual scenario of 4.5 per cent growth, the demand for gas (for home consumption alone) would far exceed what the country's present proven or even proven plus probable gas reserve can support up to 2020. This has stirred up a new debate, if not a conflicting situation. Nevertheless, gas export to India is still a top agenda of the government irrespective of whether it brings adequate benefit to the nation!

A news item on gas export to India published in The Daily Star on 10 August 2000, has agitated the issue again. But the news behind the news is that it is rather intriguing that once again UNB has reported that Dhaka may lose out to competitors in gas supply to India. Amazing isn't it. It is simply baseless because any body in Bangladesh can vouch that Dhaka was never in competition in this respect nor can it be so because of inaccurate proven reserves of gas. Yet, some vested interest may push Bangladesh into it simply to gain support for their own business interest. The report further observed that unless Bangladesh signaled its position for gas sales within the next 90 days, those (?) competitors would easily swoop in and take away the prized customers and block future opportunities for Bangladesh. The threat is that a 90-day window is likely to be expired by October, 2002. One tends to say -- to hell with such a window and such a threat. We may try to guess who are actually behind this. The ministry of energy might know it better.

No sensible person in Bangladesh take such news seriously because in the past two years foreign consultants, former and current US Ambassadors in Bangladesh, president of the American Chamber of Commerce in Dhaka, the World Bank and the

Asian Development Bank have been trying to influence the people of Bangladesh. Unocal's vice president Mr Gritters tried and failed Unocal's current Managing Director Mr Scott Barber came out with new alibi But none of them have been able to make any dent simply because none of them could tell, it convincingly. And the truth is: we do not have surplus gas to export now. The people of this poor country had pooh-poohed such threats because these are mere hogwash. The promoters of gas export are actually victims of the misconception that Bangladesh needs to sell gas more than other people needed to buy it. This had never been a true picture simply because the country has not yet got a correct clue about the reserve of natural gas. Some experts have already observed that the proven reserve does not even touch a double digit figure, while the

always more obvious to other fellow than it is to us. So is the case of ourselves and the vested interests.

Anyone who regularly reads news paper knows that the Prime Minister herself is neither complacent nor happy about gas export depriving the people. I have a feeling that she might even enquire, "Why can't the policy planners be even handed?" "Don't the Bangladeshis realize the importance of gas security," she might ask. It is unfortunate that some 'energy mughals' do not realize the danger of gas shortage, and are supporting some business groups and foreign oil company at the cost of the country's future development. It is a fact that South Asian countries are suffering from energy deficit syndrome, and Bangladesh is no exception. To protect self interest each country follows its own plan, but Bangladesh seem to be more influenced by external forces and interest groups. Except for India no other country has been able to strike even bilateral trade in energy, not to talk about a regional cooperation. India's appetite for energy is so much that after Nepal and Bhutan (electricity import) it is now aspiring through various means to import gas from Myanmar and Bangladesh. But it has never taken any sincere initiative about regional cooperation, which is a totally different ball game.

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country's demand in the next 28 years (up to 2030) is around 27 Tcf (indicating a shortage of 16 Tcf). If the reality is not heeded to by the policy planners of Bangladesh the country would be heading toward an energy crisis of formidable proportion.

Any thought that we should be forced to go on an energy diet would be totally bewildering. Owing to our zooming consumption of about 4.8 Tcf by 2010, around 13 Tcf by 2020, and under development of our only commercial energy resource (gas), predictions are that we would need to import natural gas to feed our energy infrastructure (electricity and fertilizer in particular) beyond 2015. Isn't it ridiculous that under such a circumstance Bangladesh would even consider entering into a gas supply competition? We are dependent on indigenous gas for almost 70 per cent of our commercial energy need. The prospect for impending import of over 1 Tcf of gas annually beyond 2015 should prompt us to accord priority attention to what should be done to expedite further exploration of natural gas. The nose on our face is

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epidemic spread and geographic distribution of dengue fever, as warming trends shift vector and disease distribution to wider latitudes. Dengue viruses thrive in latitudes between 30° north and 20° south since frost kills adult mosquitoes and eggs.

Leaving aside all these factors, it must be concluded that dengue is a disease of urbanisation and human travel and in the words of Suchitra Nimmanitya, a Thai specialist on the disease, the infected Aedes aegypti is a man-made mosquito. It breeds in the water that gathers in the plastic container or rubber and metal containers that litter the places where humans live and is spread by footloose humans. Mentionably, the dengue attack that was initially in the confines of Dhaka city has now spread to Chittagong, Khulna, Rajshahi and other places of Bangladesh. What is alarming about the disease, before the infection is finally diagnosed, the virus consumes the patient's platelets that normally clot blood. As the patient's blood starts thinning, it begins to ooze out from the skin and through his mouth and nose. With unusual fall in blood pressure, patient becomes restless and sinks into a coma what is usually called a "dengue shock syndrome" followed by death.

With more than 30 deaths and

the number of people affected.

A global pandemic of dengue began during World War II. In 1997, 2,40,587 cases of dengue were reported in Brazil alone. To-day, population growth, urbanisation, increased movement of people, virus, and mosquitoes contribute to continued geographic spread and increased incidence of the disease. Speaking about the U.S., concerns that dengue may be introduced to the United States from neighbouring countries like Mexico have heightened disease surveillance and interventions in border cities of Texas. Comparison of dengue incidence between the United States and Mexico showed that 62,514 dengue cases were reported in the three Mexican States adjoining Texas between 1980 and 1999, whereas only 64 locally acquired cases were reported in Texas between 1980 and 1997. The large difference in disease incidence between the U.S. and Mexico border states is probably caused by differences in living standards and human behaviour. Factors such as piped water systems, door and window screens, air conditioning and human behaviour namely filling up or spraying larvicide in ditches and drains around the houses, buildings and apartments where normally rain water accumulate undoubtedly decrease the probability of the mosquito's feeding on

rodent or insect that carries it develops immunity to pesticides. This resistance has thrown many disease control programmes into disarray. We must realise before it is too late that the growth of urban Bangladesh and breakdown of sanitation facilities also lead to outbreaks of diseases like dengue, Malaria and cholera. Too many people live too close to one another. So infections spread like wildfire.

Appallingly, in Bangladesh today there is a total breakdown of our health system with abject lack of concern for our own people. Pathetically true also, there is a complete lack of surveillance network or monitoring of diseases emerging as threat to human health. We only wake up from our deep slumber when a disease in the form of an epidemic strikes us. In the long term, the Government also needs to realise the effect that developmental activities have on disease prevalence. Besides, cities and towns need clean-up. Also needed : rapid response units -- the medical equivalent of commandos -- that could swing into action to handle outbreaks of the nature Dhaka city is experiencing now and a strong network of disease surveillance units across the country.

As already stated, Dengue is a scourge that has no vaccine and no drug and it can't be checked by spraying larvicide alone. It's impor-

vector. A clear knowledge of the habit and habitat of the vector is thus essential to mount sensible programme.

Aedes aegypti: The vector

Polka dotted white on total black, Aedes aegypti mosquito is rather small and measures about 3-4 mm in total body length. Like all other species of mosquitoes, the males are perfectly gentle and do not bite human. Fruits are their preferred dishes. But the female needs to suck on human blood, for she needs blood to mature her eggs. For God-only-knows reason, she has a special predilection for human blood, and rarely feeds on other animals. So, she *never strays away for more than 90 meters from human dwelling*. Her preferred mode of attack is from below and underneath (*usually from underneath desk and chairs and bite mainly at the feet and ankles*).

Most mosquito species lay their eggs on any stagnant water (even on dirty or polluted). But Aedes likes clean water. Sources of clear stagnant water are very often manmade and in plenty around human dwellings. Containers like earthenware

jars, drums, concrete cisterns, discarded plastic containers, used automobile tires and others that collect rainwater provide optimal habitat for breeding.

Aedes aegypti: The control

Mosquito control by killing adult mosquito is impractical, although important during emergency (as in outbreaks and epidemics). Killing effect of the insecticides is transient and sub-optimally effective, because the aerosol droplet may not get in the indoor microhabitats where the adult mosquitoes are sequestered. This is also costly and operationally demanding.

With no new and effective mosquito control technology available, public health experts emphasize community effort to reduce larval breeding sources.

What can the Public Health officials do in Dhaka?

- λ Insecticide to kill adult mosquitoes.
- λ Educate common people to reduce the breeding sources.
- λ Educate primary care physicians to diagnose and treat effectively.
- λ Develop proactive laboratory

provide early warning of an impending dengue epidemic. Surveillance results can alert the public to take action and physicians to anticipate cases.

What can the public do in Dhaka

- λ Eliminate all source of stagnant water in and around the house.
- λ Institute mosquito repellent measures as much as possible.
- λ Know early symptoms and signs of dengue and seek medical advice early. It is to be remembered that death rate from dengue hemorrhagic fever is only 2-10 per cent when adequate care is provided.

Dengue: Break the cycle

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Dengue is derived from *denga* a Swahili word thus giving a proximal, although unfounded, notion of an African origin. The first reported epidemics of dengue fever occurred in 1779-1780, almost simultaneously in Asia, Africa and North America indicating a global-tropical distribution of the disease process. In the past epidemics of dengue happened in rather long intervals (10-40 years), primarily because of slow transportation (sailing vessels and other slow means) of the virus and their mosquito vector. A global pandemic of dengue began in Southeast Asia after World War II and intensified largely during the past 15 years.

This emergence of dengue as a major public health concern has multiple abetting factors: *Firstly*, there is lack of significant effective mosquito control program in the courtyards where dengue is endemic. *Secondly*, explosive population growth and uncontrolled urbanization, resulting in inadequate water, sewer and waste management, brewed an optimal milieu for propagation of *Aedes aegypti* population. *Thirdly*, rapid transportation of dengue virus from place to place due to widespread air travel. *Finally*, there lack of surveillance and anticipatory management because of poor public health infrastructure. This has led to the "crisis mentality" with emphasis on emergency control rather than to developing programmes to prevent epidemic transmission.

Three faces of dengue

Dengue virus infection is often silent with no symptoms. When disease occurs, three overlapping symptomatic picture is recognized: *Classic Dengue Fever*. This is the milder form. It begins with sudden onset of splitting headache, fever, pain behind the eyes, back pain, leg pain and joint discomfort. This occurs mostly in non-immune individuals. Most people recover from this form of disease.

Dengue Hemorrhagic Fever (DHF): In addition to the symptoms of classic dengue fever, liver and spleen are usually enlarged. Because of an adverse change in our blood, bleeding manifestations also appear (e.g., bleeding from gums and easy bruising). With good care fatality from DHF is 2 per cent to 10 per cent.

Atyrst of three

A virus, a man and a mosquito -- a tryst, for unless all the three are in unison dengue can't happen.

Virus: First isolated in 1943, the dengue virus looks like a yellow fever virus. But unlike yellow fever virus, it's a kind of **four in one** with ominous consequences for the poor human, who suffers. And all these four viruses (called DEN 1 to DEN-4), despite great similarity, are antigenically very distinct. The practical corollary of this **four in one** paradigm is:

One has to suffer four bouts of dengue affliction before getting fully immune. And this is no fun, because more severe form of disease (DHS/DSS) is more likely to develop if an individual previously infected with one type is later inoculated with a different strain.

Man and mosquito: Unlike bacteria, a virus just cannot do it alone. It lacks all those intricate machines of life. Thus to live and propagate the dengue virus cyclically burrows into and borrows the required machines of mosquito and human.

Once a man is infected, the virus proliferates and goes to the blood. Mosquitoes feed on the infected blood. But the virus is selective. It chooses the lady-mosquito (of *Aedes aegypti* type) to dwell and multiply. About a week later, virus is ready for its next venture to get to another man for further propagation.

For the dengue virus, thus is it's cycle of life. And we, for our life must break this cycle.

Breaking the cycle

1) Kill the virus! We are not ready yet. 2) Get a vaccine and worry not! We are not ready yet. But hopes are there. Attenuated (4) candidate vaccine virus has been developed in Thailand recently. It is awaiting trial in human volunteers. Research is also under way to develop a second-generation recombinant vaccine virus (using the Thailand attenuated virus as a template). Hopes are up, but we may have to wait for 5-10 years. 3) Presently, the only effective method of containing and controlling dengue is to combat the

