

glimpse

Fall 2014

Understanding the Role of Gut Microbes in Chronic Malnutrition

Preventing Cholera Epidemics in Iraq and South Sudan

Examining the Causes of Bangladesh's Maternal Mortality Decline



icddr,b

Message from the Executive Director



John D. Clemens, MD
Executive Director

It is my pleasure to introduce the Fall 2014 issue of Glimpse, highlighting some of icddr's recent achievements. These include important new research on malnutrition, our contribution to fighting diarrhoeal diseases during ongoing humanitarian crises and recent training designed to build capacity in a new generation of international scientists. I am also excited to announce a new format for Glimpse that will keep readers updated on icddr's work and help us engage more broadly with the

global health community. Starting this December, Glimpse is going digital.

Malnutrition is recognised as the next big development challenge - it contributes to more than one third of all child deaths. icddr scientists with collaborators in the US recently found that damage caused to crucial gut bacteria by malnutrition affects the long-term ability of children to absorb nutrients, thereby hampering their development. These findings have profound implications for future interventions to tackle malnutrition since we now know that access to nutritious food by itself is not enough.

In keeping with our long tradition of lending our expertise in times of humanitarian crises, experts from icddr were deployed to Iraq in June to assist local authorities with their preparedness for cholera outbreaks in the camps receiving Syrian refugees. The conditions there are particularly conducive to outbreaks of diarrhoeal diseases. icddr experts provided technical assistance and trained local authorities on treatment and management of cholera and other infectious diseases.

This summer icddr hosted an international training on intensive vaccinology to combat enteric diseases. Scientists from around the world came to learn from our scientists' extensive knowledge in this field.

Over fifty years of dedicated work on innovative, low-cost solutions to pressing public health problems has helped put icddr in a unique position as a leading voice in global health from a developing country. We would like to give you, our readers, more frequent updates about our work and deepen our engagement with the global health community.

Starting in December 2014 Glimpse will go digital in the form of a monthly email newsletter. We hope that this will also make it convenient for you to share the icddr stories you love more easily with your colleagues in global health.

Please also make sure to keep an eye on our social media channels – Twitter, Facebook, LinkedIn and Flickr – and let us know what you like or think we can improve. We would love to hear from you. ■

For more than 50 years, icddr has provided practical, low-cost solutions to the health problems affecting billions of people living in poverty in Bangladesh and across the globe. The institution's unique proximity to the health challenges of the developing world, both urban and rural, allows for the development of evidence-based interventions that are relevant, rigorously tested, translatable and scalable in resource-limited settings.

icddr

Mohakhali, Dhaka 1212, Bangladesh
T 880.2.9827001-10
F 880.2.8819133
E info@icddr.org
W www.icddr.org

Executive Director
John D. Clemens, MD
jclemens@icddr.org

Executive Editor
Dr. Jocalyn Clark
jocalyn.clark@icddr.org

Editor
Farzana Nawaz
farzana.nawaz@icddr.org

Photography
Cover: Saber Ali B
All other photos are icddr's file photo unless otherwise indicated

Graphic Designer
Mohammad Inamul Shahriar



Damage to essential gut bacteria causes chronic malnutrition in children

New study sheds light on why in spite of nutritional interventions children fail to recover and achieve their developmental potential



icddr's Nutritional Rehabilitation Unit in Dhaka is engaged in long-term research on malnutrition

The findings of a groundbreaking study by researchers at icddr and collaborating institutions show that healthy gut bacteria damaged by malnutrition do not recuperate even after children are given nutritious therapeutic food supplements. The findings, published in *Nature* in June, may help researchers understand why millions of malnourished children worldwide continue to suffer from stunting and do not completely recover from malnutrition despite dietary interventions. Healthy microbes present in the human gut are essential for extracting and metabolising nutrients from food. In malnourished children these microbes are not healthy enough to help process essential nutrients.

The study was conducted at icddr in Dhaka, where 64 six to twenty month old children experiencing severe acute malnutrition were compared with 50 healthy children from similar socioeconomic backgrounds. The malnourished children were given either Plumpy'Nut, a peanut based enriched food supplement used worldwide for the treatment of malnutrition, or a nutritious local diet based on rice and lentils. The researchers collected stool

samples of all the children before they started receiving the therapeutic food and periodically after that for up to two weeks. The researchers continued to take stool samples every month for four months and tested them for bacterial species indicating healthy gut microbiota that normally develop within the first two years of life.

The severely malnourished children included in the study had either been admitted to icddr's Nutritional Rehabilitation Unit or were enrolled in the ongoing icddr Malnutrition and Enteric Diseases project located in Mirpur, a suburb of Dhaka.

The study findings show that while the healthy children continued to develop healthy guts, the malnourished children gained weight but only temporarily experienced an improvement of their gut. Once the dietary interventions ceased, their guts reverted back to the immature state prior to the treatment. The study shows childhood malnutrition to have a damaging effect on gut health that does not completely recover after nutritional interventions. Not only are

malnourished children underdeveloped in terms of physical growth (weight, height and body mass) their intestinal microbiota is also immature, causing a vicious cycle of childhood malnutrition.

Co-author of the study Dr Tahmeed Ahmed, who is the Director of icddr's Centre for Nutrition and Food Security said, "This research has contributed immensely to what we know about the mechanisms operating in acute malnutrition. I believe it will open up new vistas for simplifying treatment of this dreadful condition that affects millions of children globally."

This study was a collaboration between icddr, the Center for Genome Sciences and Systems Biology at Washington University, Department of Anthropology, New School

IN THE NEWS

BBC News

[Malnutrition 'Damages Gut Bacteria'](#)

The New York Times

[Malnutrition: Starving Children Lack Crucial Gut Bacteria](#)

NBC News

[When Food Isn't Enough: Gut Bugs Affect Malnutrition, Too, Study Finds](#)

International Business Times

[Malnutrition Leaves Lasting Impact on Child's Development: Study](#)

for Social Research in New York and the Departments of Medicine, Microbiology and Pathology at the University of Virginia School of Medicine. Funding was provided by the Bill & Melinda Gates Foundation, the International Atomic Energy Agency, and the US National Institutes of Health. ■

Subramanian S, Huq S, Yatsunenko T, et al. Persistent gut microbiota immaturity in malnourished Bangladeshi Children. Nature 2014; 510: 417-421.

Girls' school attendance is poor during menstruation

Challenges with menstrual hygiene management keep girls out of school in Bangladesh



Photo: The World Bank, Flickr Creative Commons

Many girls miss school days because of challenges with menstrual hygiene management

A recent survey revealed that menstrual hygiene management remains a serious challenge in Bangladesh, especially among school-age girls. Forty percent of girls surveyed report that they do not go to school for an average of three days per month during the time of their menstruation. This is a much higher rate than previous studies in South Asia that had reported absenteeism due to menstruation in the range of 14%. The study also found that 89% of students stored their

menstrual cloths in a hidden place for repeated use without washing or drying them in a hygienic manner. The study, undertaken by icddr's Centre for Communicable Diseases, aimed to assess hygiene practices among adolescents and surveyed a total of 100 rural and urban areas (both schools and household settings) across Bangladesh.

Lack of proper toilet facilities also poses a serious barrier to menstrual hygiene management. The study found schools to have a single toilet available for every 187 students, in contrast to the government standard of having one toilet per 50 students. Only 45% of schools had accessible toilet facilities

for students, only a quarter of the toilets were clean and less than 5% of schools had separate facilities for girls, which is essential for optimal menstrual hygiene management.

According to Dr Leanne Unicomb, scientist and head of the Water, Sanitation and Hygiene Research Group at icddr that led the survey, schools are important settings for disease prevention initiatives because hygiene behaviours learnt early in life can lead to habit adoption. The findings suggest that a campaign should be undertaken to address hygiene issues such as hand washing and menstrual hygiene management in order to promote healthy practices, prevent disease transmission and increase school attendance amongst girls.

icddr conducted the "Bangladesh National Hygiene Baseline Survey" in cooperation with the Bangladesh government. WaterAid Bangladesh provided financial assistance and Stanford University provided technical cooperation. ■

New evidence helps guide cholera treatment

Antibiotics and vaccines can deliver quick results in severe cholera cases and outbreak situations

Early diagnosis and treatment of cholera are key. First line approaches are oral rehydration salts (ORS) – the simple, low cost medical innovation developed by researchers at icddr in the 1960s – or intravenous fluids in more severe cases. The majority of patients respond to ORS, a simple solution of sugar, salt and water. But there are other scenarios where treatment for cholera may require something other or more than ORS and fluids, and there is now new evidence to better guide treatment.

First, more severe forms of diarrhoea or in situations where ORS alone is inadequate may mean a preference for antibiotics. In a comprehensive and independent review that represents the biggest and best collection of evidence so far, a group of infectious disease re-

searchers affiliated with the Cochrane Collaboration and icddr analysed all the available data from clinical trials on antibiotics for cholera, including Dr Md Abdus Salam, icddr's director of research and clinical administration and strategy.

Antibiotic treatment shortened the duration of diarrhoea by about 1.5 days (the normal duration is 3-4 days), and reduced the total amount of diarrhoea by half. This then cuts the need for rehydration fluids by half. By reducing the duration of the bacteria being present in diarrhoea, antibiotics shortened the time the patient is contagious. Benefits were evident for patients with severe and less severe levels of dehydration, according to the Cochrane review.

Second, in outbreak scenarios treatment plans may turn to vaccines. A new study from an outbreak in Guinea, conducted by Médecins sans Frontières and published in the *New England Journal of Medicine*, shows that two doses of an oral cholera vaccine, Shanchol, were able to protect people by 86%. Shanchol, a vaccine icddr has been instrumental in helping to develop and implement, had previously been shown to be safe and efficacious in larger trials, and it is cheap: two doses cost about \$3, or a fraction of the price of the only other WHO-approved vaccine, Dukoral. This adds to evidence supporting the use of vaccines in outbreaks. ■

Leibovici-Weissman Y, Neuberger A, Bitterman R, et al. Antimicrobial drugs for treating cholera. *Cochrane Database of Syst Rev* 2014; Issue 6. Art. No.: CD008625. DOI: 10.1002/14651858.CD008625.pub2.

icddr,b experts help displaced communities prevent cholera in Iraq and South Sudan

Experts were deployed to provide technical assistance and build capacity to fight diarrhoeal disease outbreaks in two of the world's most severe humanitarian crises



Photo: Eric Laftorgus, Flickr Creative Commons

A refugee camp in Erbil, Iraq

The onset of summer brings with it the risk of the spread of diarrhoeal diseases in countries already vulnerable because of mass displacement of populations due to recent armed conflicts. icddr,b continues to offer its assistance and expertise to the World Health Organization (WHO) in its efforts to deal with cholera outbreaks in such countries.

In June 2014 icddr,b responded to requests from WHO's Global Outbreak and Response Network (GOARN) to provide technical expertise in risk assessment and management of cholera outbreaks in Northern Iraq and South Sudan. Both countries are providing shelter to thousands of displaced victims of armed conflict. The dry, hot season combined with poor water and sanitation facilities have made the refugee camps extremely vulnerable to the spread of diarrhoeal diseases such as cholera and shigella.

icddr,b sent three GOARN experts to the Kurdistan Region in Northern Iraq in mid-June to join a technical mission made up of WHO experts and the Kurdistan Region's Ministry of Health staff. The

of Erbil, the team assisted WHO with its risk assessment of cholera and other diarrhoeal diseases in the camps set up for Syrian refugees. The icddr,b team assessed physical facilities such as housing, water and sanitation, access to health facilities, and other environmental risk

“The dry, hot season combined with poor water and sanitation facilities have made the refugee camps extremely vulnerable to the spread of diarrhoeal diseases such as cholera and shigella.”

factors that could increase the risks of disease outbreaks, to inform the cholera preparedness plans.

The icddr,b team also organised training programmes on case management to improve the capacity of the local health authorities in outbreak preparedness. The training was mainly focused on the clinical management of acute watery diarrhoea (the hallmark of cholera), setting up cholera treatment centres and strengthening the capacity for laboratory diagnosis to distinguish and diagnose specific diarrhoeal disease. The training participants included government and

private health practitioners such as nurses, doctors and health workers.

The ongoing civil war in neighbouring Syria and subsequent humanitarian crisis has resulted in thousands of Syrian refugees fleeing to Iraqi Kurdistan. According to the United Nations High Commissioner for Refugees (UNHCR), 220,210 Syrian refugees are now living in the Kurdistan region, with 86,974 in Erbil alone. The exodus has created severe overcrowding in the camps resulting in terrible living conditions that include lack of fresh water supplies and severe strain on water and sanitation facilities. Despite efforts by UNHCR (who are managing the camps), the Kurdistan Regional Government and its partners to better the living conditions in the camps, the situation appears to be worsening. Cholera is endemic in the Kurdistan region, which increases the risk of outbreaks within and beyond the refugee camps.

On his return to Dhaka, Dr Khan underlined icddr,b's commitment to assisting WHO and governments facing major public health epidemics, "We are committed to share our expertise with GOARN to help fight disease outbreaks throughout the world."

Also in June, icddr,b's Senior Medical Officer Dr SM Rafiqul Islam deployed to the South Sudanese capital of Juba on a three week mission as part of a WHO task force set up to assist the South Sudan government in containing a cholera outbreak in the city. The South Sudanese government declared a cholera outbreak in Juba in mid-May, which is ongoing. ■

Next generation of international enteric disease scientists

icddr,b shares its wealth of knowledge on enteric diseases with the international community through a pioneering training programme



icddr,b Executive Director Professor John Clemens with participants in the training

In May icddr,b organised and hosted an international training programme on intensive vaccinology in Dhaka. The programme trained participants in the epidemiological and clinical aspects of enteric infections and their prevention and control. Led by icddr,b's Centre for Vaccine Sciences, the training attracted 18 participants from India, Italy, Sweden, France, Norway, Thailand, Bolivia and Bangladesh, and was funded by icddr,b and a European Union-funded project called STOPENTERICS.

The training programme reflected the aim of icddr,b to be a global leader in the fields of immunology and vaccine sciences, and to help build capacity of a new generation of professionals dedicating themselves to the field of enteric vaccines.

Director of icddr,b's Centre for Vaccine Sciences Dr Firdausi Qadri said, "We were very happy with the outcome of the intensive course on immunomonitoring and clinical trials in the field of enteric vaccines.

The faculty from icddr,b and abroad, including the University of Göteborg and the Institut Pasteur in Paris, are the best in the field. This partnership has initiated a new era for energising upcoming scientists in the field of enteric vaccines."

icddr,b is one of 15 partners of STOPENTERICS, a Europe-based consortium that brings together expertise of groups in Europe, the Middle East, Asia and Africa working together on vaccines for shigella and enterotoxigenic *E. Coli*. ■

Preventing HPV and cervical cancer in Bangladesh

Training by icddr,b aims to raise awareness and combat a major threat to women's health



Participants in the "Pledge to Protect against HPV" programme

icddr,b is collaborating with the Obstetrical and Gynaecological Society of Bangladesh (OGSB) to improve physicians' abilities to help prevent human papillomavirus (HPV) and cervical cancer.

Cervical cancer is the second most common cancer among women in

effective at preventing infection with HPV, which is the leading cause of cervical cancer.

Currently there is little awareness among the general population, health care professionals and policymakers about HPV infection, the availability of

Bangladesh. Every year 12,000 women in Bangladesh are diagnosed with cervical cancer and more than 6,500 die from the disease. The HPV vaccine has proved

HPV vaccines and their role in cervical cancer prevention.

In order to support the OGSB, icddr,b's Centre for Reproductive Health (CRH) has initiated the 'Pledge to Protect against HPV' programme to train professionals working in the fields of obstetrics and gynecology. icddr,b will provide technical support for the development of HPV awareness materials for clinicians and for women and girls visiting health care providers in clinics.

CRH hosted a "Training of Trainers" in June for 21 participants from 18 medical colleges and hospitals as part of their continuing education programme. ■

Bangladesh's major decline in maternal deaths examined

A combination of interlinked factors, including improved access to and use of health facilities, along with reduction in fertility and poverty and increase in education levels among women and girls has led to this remarkable achievement



The success of Bangladesh's health improvements is again being celebrated, following the publication of a paper by icddr's Dr Shams El Arifeen and colleagues in *The Lancet* that documents steep declines in the country's maternal death rate. "A classic case of a low- and middle-income country achieving the unachievable which many others failed to," India-based *The Hindu* newspaper declared of Bangladesh, one of only 9 select countries in the world on track to meet Millennium Development Goal (MDG) 5 – to reduce maternal mortality by 2015. Maternal death is defined as the death of a woman while pregnant or within 42 days of the end of pregnancy.

Bangladesh experienced a 66% decrease in its maternal mortality rate between 1990 and 2010; the reduction was 40% between 2001 and 2010 alone. This was achieved by reducing the maternal mortality ratio (MMR) – the number of deaths per 100,000 live births. Bangladesh's MMR fell from 322 in 1998-2001 to 194 in 2007-2010, an annual rate of decrease of 5.6%, which

Shams El Arifeen, director of icddr's Centre for Child and Adolescent Health and first author of the paper. Factors primarily include a reduction in fertility, high-risk births, and poverty over the last two decades. Household income has risen as have levels of education for girls and women. These were partly the result of a series of cross-sector policy initiatives by the Government of Bangladesh that provided comprehensive maternal and child health services and access to family planning services, as well as overall improvements in health systems quality and integration, report the authors.

Both availability and access to facilities offering delivery services improved substantially during the past decade in

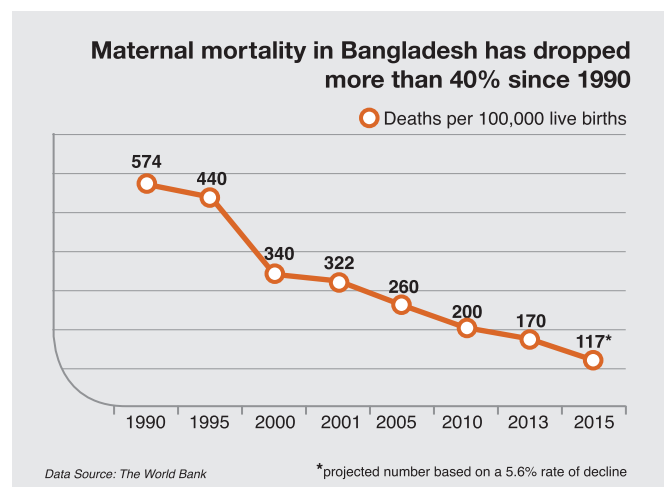
is higher than that required to achieve the MDG target between 1990 and 2015. Remarkably, the rates are similar for both urban and poor areas.

How have such gains been made? It's a combination of interlinked factors, says Dr

particular, including the transportation to reach facilities and mobile phone coverage that has increased access to health information and services. In other words, factors from both within and outside the health sector contributed to these exceptional reductions in maternal mortality.

The study was an official case study of the Countdown to 2015 for Maternal, Newborn and Child Survival, a multi-disciplinary, multi-institutional collaboration that tracks coverage of health interventions to meet the health-related MDGs, and was launched at the July Partnership for Maternal, Newborn and Child Health Forum in Johannesburg, South Africa.

The study was funded by the Bill & Melinda Gates Foundation, the UK Department for International Development (DFID), the United States Agency for International Development (USAID), the Australian Government Department of Foreign Affairs and Trade and the Government of the People's Republic of Bangladesh. ■



Glimpse is going digital! Subscribe now to our monthly e-newsletter and tell your friends

We are excited to announce a new era for Glimpse. Starting in **December 2014**, Glimpse will turn into a **monthly e-newsletter** that will be delivered directly to your inbox.

This change in format will provide you more frequent updates on our work and it will enable you to give us more direct feedback. It will also make it easy for you to share stories about icddr,b with your colleagues in global health.

What will you get with e-Glimpse?

- Updates on the most pressing global health challenges from an organisation at the forefront of global public health research
- News on low cost health innovations that save lives
- Quick, easily digestible updates on new research that can have great impact on public health policy around the world
- Insight on how health interventions are implemented on the ground in developing countries

Please subscribe by writing to farzana.nawaz@icddr.org

Be sure to follow us on social media

Stay up to date with icddr,b research and activities by following us on Twitter and Facebook



twitter.com/icddr_b



www.facebook.com/icddr

Join a professional network of icddr,b staff, alumni, and colleagues on LinkedIn



www.linkedin.com/company/icddr

Visit the new icddr,b Flickr page to view photos from our field sites, research labs, and hospital



www.flickr.com/photos/icddr



Canada



icddr,b thanks its core donors for their continued support



www.icddr.org