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OUR VISION

A world in which more people can survive and enjoy healthy lives

OUR MISSION

To solve public health problems through innovative scientific research

OUR VALUES

Excellence

We are single-minded in our pursuit of scientific rigour and operational efficiency

Integrity

We are a responsible and accountable organisation committed to the highest standards of behaviour

Inclusivity

We work together across the organisation and with our partners

ABBREVIATION

AMR	Antimicrobial Resistance	LGIs	Local Government Institutions
CCs	Community Clinics	LMICs	Low- and Middle-income countries
CDC	Centers for Disease Control and Prevention	MDCF	Microbiota-directed Complementary Food
CEPI	Coalition for Epidemic Preparedness Innovations	MDR-TB	Multidrug-resistant Tuberculosis
CHAIN	Childhood Acute Illness and Nutrition	MERS	Middle East Respiratory Syndrome
CHAMPS	Child Health and Mortality Prevention Surveillance	MHM	Menstrual Hygiene Management
CM	Child Marriage	MMS	Multiple Micronutrient Supplements
COBRA-BPS	Control of Blood Pressure and Risk Attenuation-rural Bangladesh, Pakistan, Sri Lanka	MODMR	Ministry of Disaster Management and Relief
COPD	Chronic Obstructive Pulmonary Disease	MoHFW	Ministry of Health and Family Welfare
CPAP	Continuous Positive Airway Pressure	MOMI	Multi-omics for Mother and Infant
D4I	Data for Impact	NCD	Non-Communicable Diseases
DGFP	Directorate General of Family Planning	NGS	Next-Generation Sequencing
DGHS	Directorate General of Health Services	nOPV2	Novel Type 2 Oral Poliovirus Vaccine
DR	Diabetic Retinopathy	OCV	Oral Cholera Vaccine
ECD	Early Childhood Development	OPV	Oral Poliovirus Vaccine
EED	Environmental Enteric Dysfunction	ORS	Oral Rehydration Solution
EID	Emerging or Re-emerging Infectious Diseases	PLWNCD	Population and People Living with NCDs
ERP	Enterprise Resource Planning	PPE	Personal Protective Equipment
ETEC	Enterotoxigenic E. coli	PreSSMat	Preterm and Stillbirth Study, Matlab
FDMN	Forcibly Displaced Myanmar Nationals or Rohingyas	RSV	Respiratory Syncytial Virus
fIPV	Fractional Inactivated Poliovirus Vaccine	RUTF	Ready to Use Therapeutic Food
GBS	Guillain Barré Syndrome	SAM	Severe Acute Malnutrition
GOARN	Global Outbreak Alert and Response Network	SARI	Severe Acute Respiratory Infection
GoB	Government of Bangladesh	SARS	Severe Acute Respiratory Syndrome
GP	General Practitioner	SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
HDSS	Health and Demographic Surveillance Systems	SDGs	Sustainable Development Goals
HR	Human Resources	SMC	Social Marketing Company
ICCE	Initiative for Climate Change and Environment	SRHR	Sexual and Reproductive Health and Rights
ICCH	Initiative for Climate Change and Health	TB	Tuberculosis
IgG	Immunoglobulin G	TCV	Typhoid Conjugate Vaccine
IMCI	Integrated Management of Childhood Illness	TP	Tipping Point
IPSAS	International Public Sector Accounting Standards	UHC	Universal Health Coverage
IPV	Inactivated Poliovirus Vaccine	UNICEF	United Nations Children's Fund
JE	Japanese Encephalitis	VAC	Violence Against Children
KAPN	Knowledge, Attitudes, Practices and Norms	VAW	Violence Against Women
KPIs	Key Performance Indicators	WHO	World Health Organization
		XDR-TB	Extensively Drug-Resistant TB

FOREWORD

We are delighted to present our new Strategic Plan for the next five years. The 2023-2027 Strategic Plan has been produced by our scientists under the direction of the Board of Trustees. The Board set the strategic directions, oversaw the entire process, and provided input and advice. The development of the Plan was guided by the icddr,b Scientific Advisory Group and we consulted with our development partners and collaborators, including government representatives from Bangladesh, Canada, Sweden, the United Kingdom, and the United States.

The Strategy Plan sets out our goals and priorities over the next five years to help make the world a place in which more people can survive and enjoy healthy lives. The Plan focuses on our research efforts to:

- invest, nurture and strengthen innovations;
- generate greater impact in fields of public health requiring most attention;
- deepen collaboration with partners and collaborators in Bangladesh and globally; and,
- disseminate lifesaving research results broadly to inform policy development for public health.

Through its implementation, we will endeavour to find solutions for health problems, improve health systems, respond to emergencies and humanitarian situations, and contribute to sustainable development goals. The Plan also sets out goals and priorities that will enable us to become an even stronger leading public health research institution.

I would like to end by emphasizing that our success is dependent on the support and collaboration from development partners and other public health research organizations that share our vision of a world with better and affordable health care.

Nancy Y. Cheng, FCPA, FCA

Chair, Board of Trustees

December 2022

MESSAGE FROM THE EXECUTIVE DIRECTOR

I am pleased to share our updated Strategic Plan, which sets out our research and organisational agenda for 2023-2027. It has been put together following extensive internal and external consultation, a review of our previous plan, and landscape analysis to identify new challenges. I would like to thank everyone, including members of our Board of Trustees, Scientific Advisory Group, and development partners, who contributed their insightful and constructive input.

We will continue to develop, evaluate and promote the uptake of innovations that can make a real difference to the people of Bangladesh and other LMICs. The most significant changes are the inclusion of COVID-19-related research to understand the transmission dynamics, the immune response induced by natural infection of SARS-CoV-2 or by vaccination, the role of variants, why some people are less sick than others who contracted the virus, trials of therapeutics including monoclonal antibodies, the impact of the pandemic on food security, economic loss and mental health, among others. In addition, we now consider and set goals that align with four overarching strategic directions - innovation, impact, collaboration, and reputation and branding. Many of the goals from the previous plan — for instance, improving maternal and child health and nutrition — remain relevant to Bangladesh and the rest of the world under this new framework and have thus been retained.

Moving ahead, we will continue to increase our collaborations and share our knowledge to inform policies. Our strategy is based on a clear understanding of the key health challenges of the people in the global South, with a strong emphasis on the development and evaluation of practical solutions to these challenges. We will take a collaborative approach, encouraging cross-divisional working internally while increasing partnerships externally and sharing our knowledge globally. This will allow us to conduct research and develop innovative solutions to improve the quality and quantity of life for those living in LMICs and help achieve sustainable development goals.

We look forward to working with you as collaborators and key stakeholders in the future.

Dr Tahmeed Ahmed

Executive Director, icddr,b
December 2022

ABOUT icddr,b

Originally founded in the 1960s, icddr,b was instrumental in developing oral rehydration therapy—credited with saving 70 million lives worldwide. From an early focus on cholera and diarrhoeal diseases, our scope has expanded to encompass most of the health challenges facing low- and middle-income countries.

icddr,b was founded at the onset of a major cholera pandemic in the 1960s, the then-South East Asian Treaty Organization (SEATO) established a small laboratory in Dhaka named Cholera Research Laboratory (CRL) to be operated under the National Institutes of Health (NIH), USA. Later in 1978, CRL became the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) through a Government of Bangladesh Ordinance, followed by a World Health Organization assembly in Geneva in 1979 as an international health research institution charged with developing solutions suitable for scale-up in Bangladesh and beyond. With our partners and core donors, we are developing low-cost solutions that work in Bangladesh and can be scaled up to other resource-poor settings.

Several factors have been central to our success:

- Being embedded within an LMIC, we are intimately familiar with health and health system challenges. We understand the socio-economic and cultural determinants of health, as well as local health priorities, which enable us to develop and evaluate appropriate interventions.
- By emphasising rigorous testing and scalability, we generate evidence that is not just relevant in Bangladesh but also improves the health and well-being of people living in comparable LMICs.

- We have a commitment to translating research into policy and practice and vast experience in disseminating our scientific evidence to be used by policymakers, programme managers, and the scientific community.
- Our researchers collectively comprise one of the largest and strongest communities of scientific expertise in the global South. They are extensively networked with leading research institutions in North America, Europe, and Australasia.

We see health as having interrelated components. The scope of research undertaken at icddr,b allows us to consider solutions using a multi-dimensional approach, and we are increasing our cross-divisional work to benefit from integrated learning. Underpinning our research is a unique infrastructure that enables us to undertake a full spectrum of research—spanning population-based studies and demographic surveillance, large-scale clinical trials, hospital-based clinical studies, disease surveillance, and laboratory research utilising the latest technologies.

As well as being a major facility for clinical research, icddr,b's Dhaka and Matlab Hospitals are a beacon of healthcare excellence, treating about 200,000 patients from impoverished communities each year and setting the standard for treating infectious disease

and malnutrition, among other conditions, in LMICs. For over 50 years, our Matlab Health and Demographic Surveillance Site has been the longest continuously running demographic surveillance site in the Global South. Our laboratories are internationally accredited and provide high-quality services to our scientists and the public.

BANGLADESH AND BEYOND

We work in close collaboration with the Government of Bangladesh, generating evidence to inform policy development and implementation and evaluating health service delivery. Bangladesh has undergone a health revolution, starting from population control to achieving significant child and maternal mortality reductions. Even so, there remains considerable scope to improve health. Just as icddr,b has contributed to Bangladesh's past success, we aim to deliver the evidence that will support further improvements to the health and well-being of the people of Bangladesh.

Furthermore, many of the lessons learned and innovations pioneered in Bangladesh have implications for other LMICs. Through our South-South partnerships, we aim to disseminate knowledge and tools that will benefit other populations across the Global South where the burdens of premature death and disability remain high.

SHAPING THE FUTURE

Building on our illustrious past, our challenge is now to pursue a clear set of strategic goals that will enable us to achieve maximum impact and ensure that we are able to deliver our ambitious aims over the long term.

Our strategy maintains our focus on areas of unmet health needs where we have existing strengths. This dynamic plan maintains the flexibility to respond to global health agendas such as the SDGs, emerging disease threats, emergency situations, and major disease elimination initiatives.

During the 2022 cholera outbreak in Bangladesh, we worked with the DGHS to develop an application to the WHO's International Coordinating Group to secure supplies from the oral cholera vaccine global stockpile. Subsequently, we vaccinated about 2.3 million residents of five areas of Dhaka city. Earlier, between October 2017 and December 2018, we carried out four oral cholera vaccination campaigns covering 2.2 million vaccine doses among Rohingyas and the host communities, which helped avert a cholera outbreak successfully. icddr,b provides a unique platform for conducting humanitarian activities and simultaneous collection of meaningful data, the analysis of which reinforces our efforts to develop better public health tools and measures.

We are continuing to improve our organisation to ensure it is fit for purpose, meets international standards of operation, and provides a strong platform on which to execute our strategic goals.

SELECTED ACHIEVEMENTS 2019–2022

During the course of our last Strategic Plan, we achieved a significant impact and overhauled how we operate.

FOCUSED RESEARCH AGENDA

We have successfully implemented a new focused research agenda concentrating on the key global health issues facing Bangladesh and the Global South.

GLOBAL RECOGNITION

Many of our scientists have received prestigious awards globally, including the Ramon Magsaysay Award - widely regarded as the region's equivalent of the Nobel Prize.

ORAL CHOLERA VACCINE

We carried out landmark clinical trials demonstrating the efficacy of affordable oral cholera vaccine in routine-use settings.

PNEUMONIA TREATMENT

We showed that 'bubble CPAP' oxygen therapy made from cheap, locally sourced materials could save the lives of seriously ill children with severe pneumonia. Feasibility and acceptability followed by an effectiveness study of the BCPAP among children aged 1-59 months with severe pneumonia are underway in 12 district hospitals in Ethiopia.

That pulse oximetry can be used even in sub-district small hospitals for preventing child deaths due to severe pneumonia has recently been demonstrated by our scientists.

COMBATING NIPAH VIRUS

We have developed innovative, practical tools and community engagement approaches to prevent the

spread of the Nipah virus through contaminated date palm sap. In collaboration with the CEPI, we have initiated the Nipah survivors study, which will support the development of crucial tools needed for upcoming CEPI-supported and other Nipah vaccine clinical trials and potential future regulatory review.

MALNUTRITION AND THE GUT MICROBIOME

We contributed to influential studies demonstrating how malnutrition disrupts the development of the gut microbiome, with long-term implications for health. This work has the potential to revolutionise the treatment of malnutrition in children in the days to come.

READY-TO-USE THERAPEUTIC FOOD (RUTF)

We created a cost-effective RUTF for the treatment of children with severe acute malnutrition in Asia. Further trial on locally made RUTF is underway among the FDMNs in the Rohingya Camps in Teknaf.

IMPROVING PAEDIATRIC SEPSIS CARE

Our work showed that the quality of hospital care for paediatric sepsis could significantly improve through task-shifting and protocolised management.

HYPERTENSION MANAGEMENT

Our multi-component intervention has shown promise to be cost-effective for controlling hypertension in rural areas in South Asian countries.

INTIMATE PARTNER VIOLENCE

Our work has documented alarming levels of intimate partner violence and tested interventions that significantly reduced levels of violence against vulnerable young women.

TUBERCULOSIS DETECTION

We have established an innovative social enterprise model for detecting TB and engaging the private healthcare sector in urban areas, which is now being scaled up at sites across Bangladesh.

URBAN HEALTH ATLAS BANGLADESH

We have developed a GIS-based online tool mapping health facilities in urban settings, providing an accessible tool for patients and health policymakers.

ECOSYSTEMS, HEALTH AND WELL-BEING

Our research significantly contributed to a multidisciplinary project mapping human–ecosystem relationships in the Ganges–Brahmaputra delta region of Bangladesh.

CLINICAL SERVICES

Annually, we treat about 200,000 diarrhoeal disease patients at our hospitals and treatment centre in Dhaka, Matlab and Teknaf.

HUMANITARIAN RESPONSES

We played a pivotal role in vaccination, sentinel surveillance of cholera and other diarrhoeal diseases, and other disease-control campaigns among more than 900,000 FDMNs and continue to support these groups in Cox’s Bazar. We have extended medical care to FDMNs and host communities by setting up a Diarrhoea Treatment Centre (DTC) in 2018 and a Severe Acute Respiratory Infection (SARI) Isolation and Treatment Centre (ITC) in August 2020 to combat COVID-19. We supported humanitarian missions in Ethiopia, Iraq, Syria, South Sudan, Yemen, Mozambique, and many more countries to assist in managing cholera outbreaks and training local health professionals.

COVID-19 RESPONSES

icddr,b has been working closely with the Government of Bangladesh in its COVID-19 response through various capacities, including preparing healthcare providers, strengthening health systems, disease surveillance, and research activities.

Our research on COVID-19 diagnostics, therapeutics, monoclonal antibodies, genomics, and variants have enriched global knowledge of this pandemic-causing pathogen.

STAFF DEVELOPMENT

We have introduced mentoring and ‘communities of practice’ to improve the experience of young scientists.

STRATEGIC DIRECTIONS AND GOALS 2023-2027

1. INNOVATION

GOAL 1.0 IDENTIFY AND ASSESS POTENTIAL AREAS OF INNOVATION

Develop, evaluate and promote the implementation of innovations – products, tools and innovative models of service delivery tailored to the needs of low-resource countries in the Global South. Secure intellectual property rights of innovations, where possible.

2. IMPACT

GOAL 2.1 ADDRESS HEALTH RISKS RELATED TO CLIMATE CHANGE

Study and address the impact of climate change on health, with emphasis on vulnerable groups and communities.

GOAL 2.2 ADDRESS HEALTH RISKS RELATED TO GENDER, AND SEXUAL AND REPRODUCTIVE HEALTH AND RIGHTS (SRHR)

Identify patterns of violence against women and children, and address them through designing, implementing and assessing the impact of interventions. Work to reduce child marriage and promote sexual and reproductive health and rights in populations with distinct SRH needs through understanding the major burden and underlying causes and developing interventions.

GOAL 2.3 PREVENT AND CONTROL NON-COMMUNICABLE DISEASES

Respond to the burden of NCDs, including mental health in Bangladesh and other LMICs, through identifying risk factors and testing novel solutions. Explore ways to strengthen service delivery for major noncommunicable diseases through early detection and management, particularly in hard-to-reach areas and urban slums.

GOAL 2.4 IMPROVE HEALTHCARE IN URBAN POPULATIONS AND ACHIEVE UNIVERSAL HEALTH COVERAGE

Identify and address gaps in urban health service delivery. Adopt Digital Health Technology to support patient care and Health Management Information Systems to aid decision-making and oversight. Continue to undertake policy research and promote research uptake to achieve universal health coverage.

GOAL 2.5 PREVENTING AND CONTROLLING INFECTIOUS DISEASES

Generate a better understanding of infections, associated risk factors and their transmission dynamics. Explore the causes of mortality and morbidity in humans and animals due to infections. Study the role of the microbiome, the burden of antibiotic resistance and ways of preventing it from happening, environmental contaminations and ways to reduce its exposure through WASH interventions. Study vaccines, therapeutic, diagnosis and interventions to prevent and control endemic or pandemic threats. Respond to public health emergencies and disasters.

GOAL 2.6 IMPROVE MATERNAL, NEWBORN, CHILD AND ADOLESCENT HEALTH

Identify and address causes of newborn deaths, and research early childhood development to improve child health outcomes. Explore timely identification and follow-up of high-risk pregnancies and develop innovations for appropriate management. Identify and investigate risk factors for major health conditions — including mental health — affecting women, children, and adolescents, and develop innovations to improve health outcomes.

GOAL 2.7 REDUCE MATERNAL, ADOLESCENT AND CHILDHOOD MALNUTRITION

Study biological and non-biological mechanisms underpinning maternal and childhood malnutrition. Develop innovative interventions to prevent and treat these conditions and evaluate the efficacy, feasibility and scalability of new interventions.

GOAL 2.8 ENHANCE LABORATORY SERVICES AND SUPPORT GENOMICS RESEARCH

Expand our laboratory diagnostics and genomics services and increase access to the services by patients, researchers, and/or organizations.

GOAL 2.9 IMPROVE HOSPITAL SERVICES AND CLINICAL RESEARCH

Improve the clinical services provided by icddr,b-operated hospitals. Strengthen clinical research and seek to improve patient outcomes through improved, research-informed care.

3. COLLABORATION

GOAL 3.1 IDENTIFY AND SET TARGET GROUPS FOR REGIONAL AND GLOBAL COLLABORATION

Identify academic institutions, industry researchers, funding agencies, national and international agencies, and non-government organizations that share common interests and values.

GOAL 3.2 DEVELOP AND IMPLEMENT STRATEGIES FOR ENGAGING TARGET GROUPS

Develop strategies to effectively engage with identified target groups.

4. REPUTATION AND BRANDING

GOAL 4.1 DEVELOP, REFINE, AND IMPLEMENT A COMMUNICATION STRATEGY

Improve communication of research findings through local and international media channels. Build skills and partnerships to ensure that our research evidence impacts national and international policies, programmes and practices for improved health — for instance, through increasing support to the Policy Translation Cell. Strengthen internal communications to increase awareness of icddr,b’s work and broader purpose within the organization.

GOAL 4.2 BECOME A RESEARCH INSTITUTE OF CHOICE

Work to ensure that icddr,b is widely regarded as a high-performing research organization with robust research platforms, opportunities, and resources, making it an attractive place of employment for the best professionals.

GOAL 4.3 PROMOTE ORGANIZATIONAL EXCELLENCE, COHESIVENESS AND EFFICIENCY

Promote a culture of inclusiveness in the organization and ensure diversity and equity. We will continue to modernise our operations to maximise efficiency and cost-effectiveness.

GOAL 4.4 ENSURE FINANCIAL SUSTAINABILITY

Carefully control expenditures, ensure financial risk management, and strengthen our fundraising strategy. Maximise opportunities for income generation.

GOAL 4.5 BUILD TECHNOLOGICAL CAPACITY

Improve the quality of IT services, work towards automation of organization business processes, and ensure the security of data and information. When feasible and worthwhile, incorporate big data and machine learning-based solutions into our operational framework.

There are interlinkages between some of the Goals. Priorities have been set for each of the Goals, which will be validated over the course of the five-year period. We will monitor developments in public health during the five-year period to ensure that our goals and priorities remain relevant and effective in addressing areas requiring the most attention.

GOAL 1: INNOVATION

IDENTIFY AND ASSESS POTENTIAL AREAS OF INNOVATION

We will develop, evaluate and promote the implementation of innovations – products, tools and innovative models of service delivery tailored to the needs of low-resource countries in the Global South and secure intellectual property rights of innovations where possible.

Innovation is rooted in our history. Our most notable achievement is developing the oral rehydration solution (ORS), a simple sugar-salt-water mixture for tackling the life-threatening dehydration associated with acute diarrhoea. The ORS is an innovation estimated to have saved over 70 million lives.

The ORS is a prime example of an innovation ‘made in the South, for use in the South’. Low-resource settings present major challenges, both financial and practical, and innovations developed in the North may not be affordable, culturally appropriate or suitable for use in such settings.

This innovation goal supports the attainment of SDG 3 and 9 by introducing tools and models into existing healthcare systems.

SPECIFIC INNOVATIONS THAT WE IDENTIFIED INCLUDE

- Implementing bubble-CPAP in frontline clinical facilities in Bangladesh and at least one additional LMIC.
- Scaling up a social enterprise model for improving TB care in the private sector of urban areas in Bangladesh and other high TB burden countries.
- Scaling up the use of the Q-Mat through existing referral systems in Bangladesh and globally.
- Introducing microbiota-directed complementary food to combat childhood undernutrition in Bangladesh.
- Introducing high zinc rice in Bangladesh to control zinc deficiency.
- Introducing probiotics, including one that was identified in Bangladesh, to treat infant and child malnutrition.
- Scaling up of e-partograph software widely.
- Development and production of ready-to-use therapeutic food with locally available ingredients.
- Testing the retention of body temperature of preterm or low-birth-weight neonates between 36.5°C and 37.5°C (euthermia) for 2 hours by using the optimised thermal jacket.
- Undertaking acceptability trial and measurement of calcium bioavailability of slaked lime fortified rice.
- Scaling up the Sultana-icddr,b reusable cloth pad and Sultana washer and dryer bags in school, community, RMGs and policy level.
- Laboratory testing to apply for the WHO certification of PPE and develop a sustainable commercialization model.

- Piloting Jute based, low-cost, earthquake-resilient, photochromic, self-energy efficient and eco-friendly housing model (Jutin) in the Rohingya camp and host communities.

Our current portfolio of innovations includes a low-cost bubble CPAP (continuous positive airway pressure) approach to deliver oxygen to the lungs of infants severely ill with pneumonia, as well as ready-to-use therapeutic foods made from locally available ingredients for treating children with severe acute malnutrition in Bangladesh and beyond. Bubble CPAP is also being evaluated in Ethiopia as we seek to disseminate the fruits of our labours across the global South.

We are also developing and evaluating new models of service delivery, including an innovative social enterprise model for detecting tuberculosis (TB) in the community.

Our 'Q-Mat' birthing mat for detecting excessive post-partum haemorrhage has been tested on tens of thousands of women in Bangladesh.

Our thermal jacket is an innovation that supports thermoregulation practices of pre-term and low-birth-weight neonates. The jacket covering is made of low-cost and locally available materials with a heat-generating chemical warming pouch.

Our scientists conducted a study to introduce e-partograph in two secondary public health facilities in Bangladesh and demonstrated that e-partograph improve the use of partograph and contributes to a reduction in caesarean section delivery compared to conventional paper-based partographs. This resulted in the government scaling up e-partograph in three other health facilities in Sylhet, Moulvibazar and Chattogram districts in 2018. The copyright application which was submitted to the Bangladesh Copyright Office, received approval.

If the effectiveness trial shows that our innovative locally available RUTF is effective, it can be used for children with SAM in emergency situations where food insecurity is extreme. Ultimately a Bangladeshi solution will replace the expensive RUTF that is currently being imported for use in the Rohingya FDMN camps.

Our innovative slaked lime-fortified rice for preventing calcium deficiency has been well accepted by children and women in the community and found to have good bioavailability of calcium after consumption. This fortified rice can fulfil one-fifth of daily calcium recommendations if taken three times a day. Considering that the consumption of lime-fortified rice affects bone mineral density and bone biochemical markers among women of childbearing age, further research can establish a solid foundation that will support the design of an effective intervention.

Our Sultana-icddr, reusable cloth pad is an innovation that supports improved menstrual hygiene management (MHM) practices among women and girls who use old cloth/rags to manage their menstruation. The cloth pad is made with locally available thin flannel cloth on the outside and a poly-micro fabric as an absorbent attached to the top as a water-proof barrier layer. Girls fold it to use as menstrual absorbent.

Our Sultana washer and dryer bags are simple innovations that support the easier and hygienic maintenance of reusable menstrual cloth absorbents. The Washer bag is made out of waterproof polyester fabric with a scrubbing pad attached to the inner part of the bag to scrub the menstrual cloths. The bag can be sealed with a strap at one end while washing and draining the water afterwards. The Dryer Bag is also a rectangular, enclosed mesh bag. It is black in colour to provide maximum sunlight absorption.

Jute cellulose-based biodegradable Personal Protective Equipment (PPE): single-use PPE from biodegradable, recyclable jute cellulose that coated with oligo-chitosan for added anti-viral protection to meet the rising demand for PPE that is locally produced, affordable, recyclable, biodegradable, environmentally friendly.

Jute-based low-cost, earthquake-resilient, photochromic, self-energy efficient and eco-friendly housing model (Jutin): Our Jute-based eco-friendly housing provides alternative portable housing options in hard-to-reach areas. Jutin is saline water-resistant, bioacceptable, recyclable and zero carbon emission housing material that is made of jute woven hessian cloths and resin.

GOAL 2: IMPACT

The goals and priorities for the impact of research done at icddr,b are based on a very careful analysis of the landscape, including the needs of the world as well as Bangladesh.

The nine goals will not exist in silos, but interlinkages between the goals are going to make the research results as envisioned in the Strategic Plan more impactful.

GOAL 2.1:

ADDRESS HEALTH RISKS RELATED TO CLIMATE CHANGE

We will evaluate the impact of climate change and migration patterns along with a particular focus on gender. Additionally, we will design and test climate adaptation models.

THE GLOBAL CONTEXT

Carbon dioxide emissions are on the rise, and so is the global temperature. Earth's average temperature has risen more than 1.1° Celsius since the 1880s. The last decade was the warmest decade on record. In 2013, it was assessed that it would further increase by two or even 4.8 °C by 2100 if greenhouse gas emissions continue unabated. That would lead to catastrophic outcomes for health and environmental stability. A rise beyond 1.5 °C may push the global climate past the tipping point and lock the world into an unstable climatic state. Even now, rising temperatures, ocean warming, ice and glaciers melting, rising sea level, heat stress and extreme weather events, e.g., floods, droughts, storms, cyclones etc., are contributing to global crop yield decline and livestock productivity.

This is an overall environmental crisis, and the consequences mostly affect countries and communities least responsible for the problem and least able to combat the harms. People living in low-lying, densely populated coastal regions and islands in LMICs face the greatest risk of adverse health impacts. These low-elevation areas are characterised by high risks of storm surges, coastal flooding, sea-level rise, inundation and oceanic saline water intrusion. Over half of the world's 2.4 billion people living in these areas are in Asia.

THE SITUATION IN BANGLADESH

Bangladesh is one of the densely populated low-lying areas situated on the Bay of Bengal – a focal area for cyclones over the past 100 years. The geographical location, topography, high population and population density, and an economy partially based on agriculture and fisheries make the country vulnerable, particularly in terms of health. In 2021, Bangladesh ranked seventh on the Global Climate Risk Index. Mean annual temperatures in Bangladesh are projected to increase by 1.8°C by 2060, relative to 2010. An upward trend in heat index was also seen in most regions of Bangladesh. Summer has become prolonged while winter has shortened.

Furthermore, a 1-meter sea-level rise would be devastating. It would result in simultaneous submergence of low coastal areas and inundation of 18% of the country's land (mostly allocated to agriculture). Moreover, today in Bangladesh, more than 100 million people live in areas elevated less than 16 feet above sea level. At least 20 million of these people are at risk of becoming environmental refugees due to rising sea levels. Diverse direct and indirect risks arising out of climate change in the region, related to changes in water, air, food quality and quantity, ecosystems and agriculture, affect people's livelihoods and have profound effects on

people's physical, social and psychological wellbeing. But due to the lack of integrated, cohesive data systems across the environment, demography and health domains, decisions on environmental management, health promotion, and health service provision are often made in isolation and resulting in short-term and partial solutions. Therefore, it is vital to examine human-environment interactions in the context of climate change in vulnerable rural, coastal and urban slums of Bangladesh and its impact on health and well-being.

OUR TRACK RECORD

Initiative for Climate Change and Health (ICCH), is housed under the Health Systems and Population Studies Division at icddr,b. Over the years, ICCH has implemented climate change and health studies in collaboration with other initiatives and divisions of icddr,b and national and international organisations. Moreover, the initiative uses the Health and Demographic Surveillance Systems (HDSS) platforms of Matlab (rural), Chakaria (coastal), and Urban Slum (urban), covering nearly half a million population.

We have already reported the association between high blood pressure and drinking water salinity; the link between temperature and miscarriage; the negative impact of temperature on child nutrition; association between air pollution and low birthweight and preterm births. We also observed higher preterm births and

excess mortality in Chakaria. We found temporal migration amplifies the inequity in healthcare utilisation in climate-vulnerable coastal populations. With the German Red Cross, we have mapped existing data to forecast natural disasters.

ICCH created an 'EnHealth-Bob' network in the Bay of Bengal to link information and data from public health and climate change domains and is an active member of the South-East Asia Region Advisory Group, WHO-Alliance, Planetary Health Alliance and other organizations working to strengthen links between multilateral initiatives on climate change and health.

We have worked in tandem with the Climate Change and Health Promotion Unit of MoHFW, Bangladesh, to examine human-environment interactions in the context of climate change in the vulnerable coastal areas of Bangladesh.

OUR APPROACH

Drawing on our long experience in health and population research in Bangladesh, we are well placed to shape and inform discussions on the appropriate response to climate change (e.g. National Health Adaptation Plan, transmission of vector-borne diseases, drinking water and salinity, human migration), while also ensuring that discussions are relevant to other countries facing similar challenges.

SPECIFIC PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goals 2, 3, 11 and 13 through the evaluation of climate change, vector-borne diseases and human migration. We will also evaluate the impact of climate change and migration patterns on population health in Bangladesh and the ways in which populations can adapt. We will do this specifically by conducting research with the goal of addressing health risks related to climate change with a focus on the following priority areas:

Goal	Priorities
2.1 Addressing health risks related to climate change	Identifying and addressing the impact of climate change on human health and testing novel interventions
	Exploring and addressing gender issues emerging from climate change
	Increasing the resilience of vulnerable communities to climate related risks by designing and testing adaptation models
	Impact of climate change on food systems and migration

GOAL 2.2:**ADDRESS HEALTH RISKS RELATED TO GENDER, AND SEXUAL AND REPRODUCTIVE HEALTH AND RIGHTS (SRHR)**

We will identify patterns of violence against women and children and address them through designing, implementing and assessing the impact of interventions. We will similarly work to reduce child marriage and promote sexual and reproductive health and rights in populations with distinct SRH needs through understanding the major burden and underlying causes, and developing interventions.

THE GLOBAL CONTEXT

In many societies, patriarchal social structures along with rigid social and gender norms, disadvantage women. They do not usually enjoy access to and control over resources and health rights equal to men. Such gender asymmetry creates scope for discrimination and violence, reflecting on women's health outcomes. An estimated one in three women worldwide has experienced either physical and/or sexual violence in their lifetime. Most of this violence is perpetrated by an intimate partner. All of these have a significant adverse impact on physical, mental, sexual and reproductive health.

THE SITUATION IN BANGLADESH

Violence against women is a major public health issue in Bangladesh, with one in two ever-married women reporting lifetime physical and/or sexual abuse perpetrated by their husbands. Women and girls in Bangladesh face numerous challenges in sexual and reproductive health. Denial of rights to consent and choice lies at the core of these challenges. The country also has multiple sexual minorities and other vulnerable populations who face significant barriers to accessing sexual and reproductive health and rights.

OUR TRACK RECORD

We have a long history of working on gender inequalities, women and girls' empowerment and on sexual and reproductive health and rights of vulnerable populations. We have developed scales for measuring intimate partner violence against women, explored levels of and contributors to intimate partner violence in Bangladesh, and developed an intervention that significantly reduced physical violence against married adolescent girls in Dhaka slums. We are piloting a social norms-based intervention to reduce child marriage and another intervention to empower married adolescent girls to promote their sexual and reproductive health and rights.

We have established strong links with sexual minority groups and the organisations that work with them to continuously strengthen and support their voice in claiming their health rights and improving the services offered to them.

OUR APPROACH

Building on our existing strengths in researching gender-based violence, we are broadening our research scope with a particular focus on intersections between violence against women and violence against children

to address the intergenerational transmission of violence using longitudinal data collected from two consecutive generations over a 19-year period. We will evaluate approaches for reducing child and forced marriage (e.g. ‘Tipping Point’ trial of child marriage prevention) and support the government in implementing the Plan of Action for curbing child marriage. Furthermore, through our AdSEARCH, a multi-year research project involving different divisions of icddr,b, we aim to improve SRH outcomes and realisation of rights among different population groups with distinct SRH needs in Bangladesh, including adolescents and young people, newlyweds,

pregnant women, women working in the RMG sector, and key populations with diverse gender and sexual orientations. AdSEARCH focuses on generating new evidence by developing and testing innovations to address existing gaps, improve SRHR status, and influence policies and programmes related to family planning, abortion, post-abortion care, STIs/RTIs, reproductive cancers, and maternal and neonatal health. The project also supports women and girls in realising and practising agency and autonomy related to SRHR. The project activities are implemented through several work packages and other project components.

RESEARCH PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goals 3 and 5 through the evaluation of key gender-related health issues and interventions. We will achieve this by:

Goal	Priorities
2.2.1 Reducing violence against women and children	Identifying patterns of violence against women and children, their intersections and factors driving them
	Assessing impact of interventions to address violence against women and children
2.2.2 Reducing child marriage	Assessing trend and determinants of child marriage and explore drivers of differential trends in different geographic areas
	Measuring impact of interventions to reduce child marriage
2.2.3 Addressing gender in sexual and reproductive health and rights	Identifying gendered needs and challenges in SRHR of special and marginalised populations
	Assessing impact of interventions to address gendered needs and challenges in SRHR of special and marginalised populations
	Understanding the stressing SRHR concerns and developing an invention and innovation hub to address them

GOAL 2.3:

PREVENT AND CONTROL NON-COMMUNICABLE DISEASES

We will respond to the burden of NCDs in Bangladesh and other LMICs by identifying risk factors and testing novel solutions. We will explore ways to strengthen service delivery for major noncommunicable diseases through early detection and management, particularly in hard-to-reach areas and urban slums.

THE GLOBAL CONTEXT

The major NCDs, including coronary heart diseases, diabetes, stroke, COPD, and mental health, are the major killers worldwide. NCDs contribute to 41 million deaths every year, including 31.4 million in LMICs. Over 15 million deaths from NCDs occur between the ages of 30 and 70, and 85% of these deaths occur in the LMIC. The emergence of NCDs poses substantial threats to health, development, and economic growth in LMICs, leading to a devastating burden for families, communities, and overwhelming public health systems. NCDs are estimated to cost health systems an estimated 30 trillion USD globally by 2030.

THE SITUATION IN BANGLADESH

Bangladesh, a low- and middle-income country in South Asia, has been experiencing a demographic transition along with a gradual increase in life expectancy and epidemiological transition from communicable to Non-Communicable Diseases with rapid urbanization. NCDs contribute to 59% of total deaths in Bangladesh, and an increasing trend has been reported in the most recent BDHS survey (2017). The behavioural, metabolic, and physiological risk factors for NCDs are highly prevalent in Bangladesh, and 99% of the population has at least one NCDs risk factor.

Currently, Bangladesh is dealing with the double burden of malnutrition. The prevalence of underweight has decreased remarkably over the past decades, while the prevalence of overweight and obesity increased at an alarming rate leading to the emergence of other health issues, including NCDs. A high burden of gestational diabetes mellitus and eclampsia among pregnant women accelerates the risks of NCDs in women, and children born

of the mothers with gestational NCDs are at a higher risk of developing NCDs in later life.

The government of Bangladesh has developed a national strategy for the surveillance and prevention of NCDs. A dedicated unit has been established within the MoHFW, and new service delivery options are being piloted. However, the treatment of NCDs has been challenging, and COVID-19 among individuals living with NCDs has rendered an unprecedented burden on the national health systems as well as at the individual level. Unfortunately, currently, there is no plan for scaling up the proven solutions to control or reduce the risk of major NCDs at a mass level, which could promote effective control of NCDs and prevent deaths from COVID-19 among individuals at risk of NCD. Strengthening the national institutions for conducting research and clinical trial for controlling major NCDs during pandemic would be imperative to prevent premature deaths from both NCDs and COVID-19.

OUR TRACK RECORD

The Initiative for NCD at icddr,b has played a pivotal role in identifying several ground-breaking solutions for the prevention and control of NCDs across different stages of the life cycle both in Bangladesh and beyond. Our innovative multi-component intervention for the control of hypertension in rural communities has been proven to be cost-effective and acceptable to all level stakeholders, including both the patients and the providers. The evidence of this trial supported the NCD Control Program, DGHS, to develop a national guideline for the treatment of hypertension and diabetes using generic drugs and provide directions for ensuring adequate supplies of essential NCD drugs in all primary facilities in Bangladesh

We have conducted several national surveys and built multiple research cohorts across a wide range of socio-demographic and NCD profiles in Bangladesh. A few examples are hypertensive cohort, diabetic cohort, a cohort of GDM, children born to mothers with NCD, women of reproductive age, under-five children, individuals living with hypertension, diabetes, cardiovascular disease, dementia, COPD, and older people. We have a biobank of samples obtained from individuals with NCDs or at risk of NCDs across all ages, which will be utilized for advanced research, including genomic research relevant to NCDs and COVID-19. Through our research activities, we have built strong collaborations with reputed research institutions in Bangladesh and the global South. We regularly exchange our research knowledge with a wide range of audiences globally through our network with The Global Health Network, Oxford University.

We have played a pioneering role in the research capacity strengthening of the clinicians, public health researchers and faculty through our innovative platform, “Clinical Research Platform, Bangladesh”, a tripartite initiative of the Bangabandhu Sheikh Mujib Medical University (BSMMU), the British Medical Journal (BMJ) and icddr,b. We have established The Global Health Network Asia and Global Innovation Hub for Multimorbidity Solutions to promote research collaborations on multimorbidity across institutions in Asia and disseminate newer findings on emerging issues, including NCD multimorbidity in the COVID-19 pandemic.

SPECIFIC PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goals 3 and 4 through the evaluation of new interventions relevant to low- and middle-income countries, with a focus on cardiovascular disease, diabetes and mental health disorders. We will do this specifically by conducting research with the goals of:

Goal	Priorities
2.3 Understanding the burden and developing solutions for the prevention and management of Non-Communicable Diseases	Identifying risk factors and testing solutions for major NCDs and mental health conditions of different population groups
	Strengthening service delivery for major NCDs through early detection and management
	Identifying needs and challenges for strengthening NCDs services in coastal areas, wetlands, chars and urban slums
	Establishing research infrastructures in healthcare settings and capacity building of healthcare providers for synthesis of data on NCDs in LMICs

OUR APPROACH

Most of the noncommunicable diseases are diseases of the middle-aged and the elderly. The improvement in the detection and management of NCDs is likely to prolong lives. Therefore, it is important also to look at how geriatric health can be improved.

Our future work has a particular focus on developing pragmatic low-cost solutions for NCD risk reduction and implementing already identified best practices in order to prevent premature deaths. We will generate new evidence and knowledge from the existing data sets through pathfinder projects in NCD, along with the impact of other cross-cutting issues in NCD, such as infectious diseases, nutrition, environmental change, genomics etc. We will apply the research-driven evidence for strengthening services at the primary care facilities for early detection of major NCDs (Hypertension, Cardiovascular Diseases, Mental Health, Diabetes, and Cancer) through a life course approach and control the disease severity of NCDs in order to prevent premature deaths due to NCDs. We will establish the ‘Centre for Data Excellence’ to generate time-sensitive evidence and build the capacity of the local-level health managers for decision-making about health emergencies, particularly during the global pandemic and supporting the quality of health care. It will be strategic to link the Center for Data Excellence with data centres in other parts of the world, perhaps through establishing a regional data centre network.

GOAL 2.4:**IMPROVE HEALTHCARE IN URBAN POPULATIONS AND ACHIEVE UNIVERSAL HEALTH COVERAGE**

We will identify and address gaps in urban health service delivery. We will adopt Digital Health Technology to support patient care and Health Management Information Systems to aid decision-making and oversight. We will continue to undertake policy research and promote research uptake to achieve universal health coverage.

THE GLOBAL CONTEXT

Demographic and epidemiological transitions around the globe have resulted in an ageing population and a greater prevalence of chronic diseases that require better access to quality healthcare services, especially in urban areas. In reality, tens of millions of people lack access to adequate healthcare services or become impoverished due to catastrophic health expenditures. The poor and the vulnerable are the most affected. Universal health coverage, a global political agenda set out in the Sustainable Development Goals, has gathered momentum. Through action at global and national levels, universal health coverage would ensure equitable and sustainable quality healthcare services for all by strengthening and improving access to health systems and reducing financial barriers.

THE SITUATION IN BANGLADESH

In Bangladesh, the government is the largest health service provider. It supplies the infrastructure for the district health service delivery system, except in larger cities where services are mostly dominated by the unregulated private sector. High out-of-pocket expenditure and inequity are the two major concerns hindering the financially disadvantaged from utilising healthcare services. Inefficient human resource management, lack of motivation by providers, and poor governance and accountability are the major supply-side limitations of the national health system. This is in addition to an absence of a formal referral system and the lack of inter-departmental coordination, which reduces efficiency due to excessive patient flow and poses barriers to finding quick solutions to enduring health system issues.

OUR TRACK RECORD

icddr,b is committed to the principle that all people, irrespective of their social and economic position, should have access to affordable, acceptable, high-quality and responsive healthcare. The conceptual framework for our work is provided by the six building blocks of health systems identified by the WHO as service delivery, health workforce, information systems, medical products, financing, and leadership and governance.

The strength of our research is demonstrated by the impact it has had in strengthening the urban health service delivery systems from evidence generated by the newly established urban health surveillance system and a GIS-based Health Atlas, which maps health service delivery points. Our research also identified gaps in multisectoral coordination for effective planning and service delivery. We have extended our research support to the Government to evaluate the national health protection scheme for the poor, the cost of an essential health service delivery package, and the development of a monitoring framework for universal health coverage.

Our field site in Chakaria in southeast Bangladesh has enabled the development of a micro-health insurance model and the monitoring of health equity indicators. Our research has influenced the Government to develop an immunisation policy that will reach marginalised populations and has motivated changes in the current strategy which will ensure the timely vaccination of children. We have invested in the skills development of young researchers and policy and programme personnel regarding universal health coverage and evidence-informed policy planning. A systematic review centre and a 'think tank' have also been established for evidence synthesis and policy advocacy.

OUR APPROACH

We will continue to leverage our expertise to strengthen the urban health service delivery system (e.g. introducing ICT-based mapping of health facilities, evening outdoor services in public facilities), improve health financing mechanisms (e.g. adapting learning from Chakaria micro health insurance in the national health system), develop models for efficient utilisation of the health workforce, and identify new approaches to achieve greater compliance from the private sector through regulatory measures.

Our research will focus specifically on increasing service availability, improving access to quality care, reducing out-of-pocket expenses for healthcare and the impact of catastrophic expenditures, improving the health and social well-being of the elderly, and minimising the negative impacts of social determinants of health. As Bangladesh has an acute shortage of trained workforce for quality health care services, to address the gap, we will provide our research support to the Government in the identification of gaps in human resources, evaluation of HR programs on health for efficient utilisation of resources and improving quality of health care services. Considering the lacking of primary health care service delivery systems in urban areas, we shall extend our research support to

the Government to establish a General Practitioner (GP) system in the urban settings that will have a significant impact on structural reform for health system governance, empowerment of local government institutions and avail a sustainable health service delivery system for the people living in urban areas. To combat unsafe food systems in urban settings, we will explore the food environment in informal urban settlements in designing effective urban food system interventions through a detailed understanding of the demand and supply-side factors. We have also included a new goal to understand the impact of COVID-19 on health and the health system to inform policy making around enhanced health system resilience and responsiveness.

We will continue to engage policymakers and implementers at the national as well as the grassroots level by encouraging the use of evidence-based strategies to address health system challenges. We will also develop stronger links with global universal health coverage by undertaking research on regional and country comparisons to assess progress in the implementation of UHC. We will also continue undertaking research on monitoring and supervision of systems for improved governance and accountability.

SPECIFIC PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goal 3 through the conduct of health system and policy research in order to increase accessibility, improve quality and reduce financial barriers to healthcare. We will do this specifically by conducting research in the priority areas of:

Goal	Priorities
2.4 Improving universal health coverage through identifying challenges and developing interventions	Identifying the gaps (equity, quality, accessibility, affordability) and developing innovative models to strengthen health service delivery
	Developing and implementing Digital Health Technology (eHealth/mHealth) to strengthen health systems (prevention/monitoring, continuity of care, quality of care)
	Maximising the utilisation of icddr,b Health and Demographic Surveillance System (HDSS) platforms and other data sources for data-driven decision making
	Undertaking policy research and promoting research uptake to influence health, population, and nutrition policies and programs for strengthening governance and multi-sectoral engagement (public, private, and other relevant sectors)
	Assessing efficiency (economic evaluation) and equity in health financing and identifying gaps in resource allocation

GOAL 2.5:**PREVENTING AND CONTROLLING INFECTIOUS DISEASES**

We will generate a better understanding of infections, associated risk factors and their transmission dynamics. We will explore the causes of mortality and morbidity in humans and animals due to infections. We will study the role of the microbiome, genome, the burden of antibiotic resistance and ways of preventing it from happening, environmental contaminations and ways to reduce its exposure through WASH interventions. We will study vaccines, therapeutic, diagnosis and interventions to prevent and control endemic or pandemic threats. We will respond to pandemics, emergencies and disasters.

THE GLOBAL CONTEXT

Despite progress in developing vaccines and antimicrobial agents, infectious diseases continue to present a profound threat to global health, economic development and political stability. Common respiratory, enteric, and other infections in at-risk settings and among vulnerable groups, emerging infectious diseases, and the rise of resistance to antimicrobial drugs constitute the biggest current challenges in the global prevention and control of infectious diseases.

The world is becoming increasingly urban, with most of this growth taking place in urban slums in LMICs as well as countries graduating in status. As the rural poor migrate to urban cities, they often occupy areas that are overcrowded, unhygienic, and lack basic infrastructure (e.g. housing, sanitation, water). Slum-dwellers are typically malnourished and immunosuppressed and thus susceptible to enteric and respiratory pathogens. Globally, enteric and respiratory infections are the leading causes of morbidity (e.g. impaired growth and cognitive development) and mortality in children. There are nearly 1.7 billion cases of childhood diarrhoeal disease every year in the world (WHO 2017), while pneumonia is the single largest infectious cause of death in children worldwide. Pneumonia killed 740,180 children under the age of 5 in 2019, accounting for 14% of all deaths of children under five years old but 22% of all deaths in children aged 1 to 5 (WHO 2021).

The most potent current example of a recently emerged disease is the COVID-19 pandemic, which has already led to more than 6 million deaths and contributed to an atmosphere of anomie and anarchy. The global history of emerging or re-emerging infectious diseases shows that, on average, they have appeared about once a decade since 1940. Recently, however, the time between pandemics have become shorter, as evident by SARS in 2003, influenza A H5N1 (bird flu) in 2007, H1N1 (swine flu) in 2009, the MERS in 2012, and Ebola in 2014. The US CDC ranks H7N9 as the flu strain with the greatest potential to cause a global pandemic. Apart from rabies, most national surveillance systems in the world do not monitor zoonotic diseases appearing in wildlife, yet 72% of zoonotic EIDs (e.g. anthrax, Nipah virus, hantavirus, type A influenza, SARS, MERS-CoV, Ebola) come from this source.

Many RNA viruses have emerged and dispersed globally, such as the Chikungunya virus, West Nile virus and Dengue virus. These three arboviruses alone account for morbidity and mortality tolls that far exceed the combined rates of SARS, Ebola and MERS-CoV. Thus, it is important that EID discovery efforts are directed toward reservoirs and vectors at the human-animal interface. The integration of human, veterinary, and agricultural medicine, as proposed by the 'One Health' approach, should result in an earlier warning of EIDs and provide us with a better opportunity to respond to potential spill-over threats.

Multidrug resistance in *Mycobacterium tuberculosis*, *Streptococcus pneumoniae* and *Staphylococcus aureus* are of global concern, and Gram-negative bacteria resistant to β -lactams are widespread. Drug resistance in enteropathogens has also become a major global health challenge. Multidrug-resistant *Salmonella enterica* Typhi and *S. enterica* Paratyphi are common in Asia and sub-Saharan Africa, and there are increasing reports of reduced susceptibility to fluoroquinolones. Resistance of *Campylobacter jejuni* to fluoroquinolones has become a concern in South-East Asia, with rates of resistance of 80% reported in Thailand. Viral pathogens (e.g. Ebola, Makona variant, MERS-CoV, H1N1) are also of concern due to their high rates of nucleotide substitution, poor mutation error-correction rate ability, and capacity to quickly adapt to human hosts. The recent worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has heightened the threat of zoonotic spillover of such pathogens and its devastating outcome on the human population to a new level.

THE SITUATION IN BANGLADESH

By 2030 the global urban slum population is expected to grow from one to two billion. In Bangladesh, this transition is well underway, with approximately one-third of the population in the nation's capital, Dhaka, living in slums. Evidence-based integrated control strategies (e.g. vaccination, WASH, nutrition, and therapeutics) are needed to address this emerging humanitarian crisis. icddr,b is well-positioned to take the lead in providing such evidence and meeting the needs at our doorstep and in the Global South.

Despite improvements in the control of infectious diseases, Bangladesh remains one of ten countries with the highest burden of pneumonia and other respiratory infections, tuberculosis, diarrhoea, as well as enteric fever-related deaths. Collectively, these pathogens are responsible for nearly one in every five deaths. The burden of these diseases has profound health and socioeconomic impacts. While existing interventions need to be delivered in order to address the immediate challenges, new interventions are also required based on a deeper understanding of pathogen biology, host-pathogen interactions and evolution.

Bangladesh is considered one of the critical global hotspots for emerging infectious diseases [1]. Dengue is common in the capital city of Dhaka and is an emerging

risk in rural areas. Nipah virus causes yearly outbreaks of encephalitis in Bangladesh, with more than 75% case fatality. Another highly pathogenic avian influenza H5N1 is also endemic in Bangladeshi poultry but has thus far caused only mild illness in humans. Since March 2020, Bangladesh has been affected by the COVID-19 pandemic and reported millions of cases and thousands of deaths. Yearly anthrax outbreaks also occur in ruminants, such as cattle, with some human infections. Multidrug-resistant tuberculosis (MDR-TB) is also common in Bangladesh, and the infrastructure to treat MDR-TB is relatively limited. The global spread of antimicrobial resistance, some originating from Bangladesh and other parts of South Asia, has caused international concern.

[1] <https://www.nature.com/articles/s41467-017-00923-8>

OUR TRACK RECORD

Our outstanding laboratory, clinical, and population-based research has enabled us to make major contributions to the fields of infectious disease epidemiology, immunology and microbial pathogenesis. We are internationally recognised for the quality of our research related to diarrhoeal diseases, including pioneering molecular-genetic studies of the cholera pathogen *Vibrio cholerae*. In addition, our clinical trial programme is conducting phase I-IV vaccine trials (e.g. on cholera, *Shigella*, Enterotoxigenic *E. coli*, rotavirus, typhoid, hepatitis E and B viruses, human papillomavirus, respiratory syncytial virus, Meningococcal Conjugate vaccine, rabies and influenza) through well-established urban and rural field sites.

We have a long-standing collaboration with the US CDC, which has enabled us to build platforms to track infections through hospital-based surveillance and population-based surveys. In addition, our laboratory capacity allows us to study emerging infections and antimicrobial-resistant pathogens.

We are also partnering with USAID's Emerging Pandemic Threats programme and routinely respond to infectious disease outbreaks in partnership with the IEDCR, Bangladesh, and in collaboration with the local One Health initiative. As a member of the Asia Pacific Malaria Elimination Network, we are contributing to the regional elimination of malaria by 2030.

Recently, we have partnered with the CEPI to trial new vaccines under development for the Nipah virus and examine the immunogenetic profile of survivors.

Our contributions to COVID-19 research include but are not limited to clinical, humoral, cellular immunology and genomics research; evaluation of diagnostics of SARS-CoV-2; efficacy of certain medications for the treatment and management of COVID-19; evaluation of interventions to detect, prevent and mitigate COVID-19, and effectiveness of SARS-CoV-2 vaccine. Besides, icddr,b has been conducting environmental/sewage surveillance to assess the presence of SARS-CoV-2 viral RNA in the environment; and monitoring the circulation of SARS-CoV-2 in animals, especially in bats.

OUR APPROACH

Our work spans the full spectrum of infectious disease research, from the basic laboratory sciences to field-based clinical trials, mathematical modelling, policy development, and implementation. Over the next Strategic Plan period, we will continue our research on all levels to address both immediate needs and new emerging pathogenic threats for humans and with an “one health” approach. Moreover, we will focus our efforts on meeting the demands of disadvantaged populations (e.g. urban slum dwellers, rural poor,

and FDMNs as these are where the greatest burden of disease resides and the source of present and future epidemics (e.g. SARS-CoV-2, Nipah virus). We will also expand our research portfolio on respiratory infections (e.g. influenza, RSV vaccination of mothers, and prevention of infection with monoclonal antibodies in infants), microbiomics, diagnostics, antimicrobial resistance (AMR), mathematical modelling, genomics and integrated control strategies.

We will determine the underlying causes of both enteric and respiratory diseases and their associated host immune responses. We will also develop cost-effective vaccines and therapeutic interventions to prevent and treat these pathogens in LMICs. In urban slums, vaccination and treatment will be combined with WASH, nutrition and preventive therapeutics to halt disease transmission.

We believe there is an urgent need for a new perspective that emphasises coordinated global surveillance and intervention to identify existing and emerging infectious diseases efficiently, which must extend from humans to all potential reservoirs and vectors that may harbour or transmit pathogens.

SPECIFIC PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goals 3, 6 and 11 through the detection and control of enteric, respiratory and zoonotic infections, including emerging and re-emerging infectious diseases. We will do this specifically by conducting research with the goals of:

Goal	Priorities
2.5 Preventing infectious diseases and related environmental threats, and preparing for pandemics, emergencies and disasters	Assessing burden and transmission and identifying key vulnerable populations and risk factors for infections
	Identifying the aetiology, morbidity and mortality in communities, patients and animals with infections
	Exploring the role of the microbiome in health and infections
	Assessing burden, identifying risk factors, monitoring patterns of antimicrobial resistance and its prevention
	Developing, evaluating and scaling up vaccines and other therapeutic, diagnostic, and behavioural interventions to improve health and preparing for endemic and pandemic threats
	Determining and mitigating environmental contaminants and evaluating WASH strategies for improved health

GOAL 2.6:**IMPROVE MATERNAL, NEWBORN, CHILD AND ADOLESCENT HEALTH**

Identify and address causes of newborn deaths, and research early childhood development to improve child health outcomes. Explore timely identification and follow-up of high-risk pregnancies and develop innovations for appropriate management. Identify and investigate risk factors for major health conditions — including mental health — affecting women, children, and adolescents, and develop innovations to improve health outcomes.

THE GLOBAL CONTEXT

In every two minutes, a woman somewhere in the world dies due to a pregnancy-related complication; 60% of these deaths are caused by five conditions that are potentially preventable. Each year, an estimated 5.2 million children under five years of age die globally; 2.4 million of them are neonates, meaning under 28 days of age. A further 2 million pregnancies end in stillbirths — the baby dies in the womb after 20 weeks of pregnancy.

Neonatal health, child development, adolescent health and maternal health are inextricably linked. Improving women's health and quality of care during pregnancy and during and immediately after childbirth could substantially lower maternal and neonatal mortality and stillbirths. Among children who survive, malnutrition, infections, and other factors delay development and could have a lasting impact on their health and wellbeing.

In the case of adolescents, biological and social role changes make them more vulnerable. Issues related to sexual and reproductive health and rights have far-reaching implications for the health of adolescents and adults, particularly women. Globally, almost 4.3 billion people of reproductive age are estimated to have inadequate sexual and reproductive health services over the course of their lives.

THE SITUATION IN BANGLADESH

Despite remarkable progress, the mortality rate among mothers and newborns in Bangladesh remains high. A dramatic decline in deaths among children under five mostly reflects reduced post-neonatal mortality. Just over 50% of women in Bangladesh still deliver at home without a skilled birth attendant. Coverage of effective interventions during pregnancy and childbirth in Bangladesh, while increased, remains sub-optimum, and the quality of services is generally poor.

OUR TRACK RECORD

We have a long history of developing and testing maternal and child health interventions and ensuring they are adopted into policy and practice in Bangladesh and across the world. Several of our innovations have been scaled up, including a community health worker-based family planning programme, magnesium sulphate to manage severe pre-eclampsia and zinc to control diarrhoea. Our findings on the antiseptic chlorhexidine to prevent umbilical cord infections have influenced national and global policymaking. Moreover, early home visits after childbirth as a strategy to improve newborn survival is also now a global policy.

Collaborating with the DGHS, we have developed, tested and successfully incorporated a set of Newborn Signal Functions in the national monitoring checklist to assess the readiness and functionality of health facilities in providing neonatal health services. In collaboration with researchers in the UK, Tanzania and Nepal, we conducted a study to assess the validity of measuring coverage of key maternal and neonatal health interventions through the routine health system. The GoB's DGHS updated the national register and reporting form for measuring coverage of injectable antibiotics among newborns with severe infections and is also introducing an inpatient register for the management of newborn and sick children as a result of this study.

We have joined a Multi-omics for Mother and Infant (MOMI) consortium based on the previously collected data from the Preterm and Stillbirth Study, Matlab (PreSSMat) study. Under this project, along with other consortium members, we have completed Pilot omic (transcriptome, proteome, metabolome, lipidome and immunome) analyses, initial quality assessment and histopathology analysis, and selenium analysis by using the specimens that are stored in the PreSSMat biorepository located in Matlab field site of icddr,b. We have received a follow-up grant to continue working in the consortium.

In 2022, the Lancet Global Health founded a new Commission with the aim of addressing major gaps in oxygen research, promoting best practices, and accelerating the impact towards strong oxygen systems and reduced mortality and morbidity globally. Bangladesh is one of the co-chairs of this Commission, and Senior Director, MCHD at icddr,b is one of the commissioners. It is expected that this Commission will shed light on the burden of hypoxemia, how to define and measure oxygen access, which oxygen solutions work best in different settings, and how to generate the financing and political will to achieve transformational change. The Commission is co-chaired by Makerere University in Uganda and the University of Melbourne, and Murdoch Children's Research Institute (MCRI) in Australia.

OUR APPROACH

Our work spans the full spectrum of research, including epidemiological studies (e.g. indoor air pollution), operations and implementation research, clinical trials, basic upstream research, and health systems research. Over the next Strategic Plan period, we will adopt a more systematic life-course approach, expanding our research from maternal and neonatal health to include child health and development, adolescent health and well-being, as well as broaden our horizon and prioritise SRHR for population groups with special needs in our agenda.

The main causes of maternal, neonatal and child mortality and morbidity are now well understood, and in many cases, effective interventions have been developed. We will actively participate in the development of national policy and rapid translation into programmes while continuing to seek opportunities to apply the learning gained in Bangladesh to other low-income countries. Reducing inequities will be an overarching principle that will guide all the proposed work and will be a key component of our research goals.

Factors affecting adolescent health need to be better understood, and there is a growing recognition of the need to safeguard mental health in this group and in women. We plan to set up a cohort of adolescents to be followed for 24-30 months to gain an in-depth understanding of their SRHR needs, SRHR-related care-seeking practices and programme coverage. We also plan to design and test some innovations to improve the SRHR of women and adolescent girls.

We adopt a participatory approach in designing and implementing studies with the active involvement of the GoB policymakers and programme managers. We aim to promote country ownership and ensure Government leadership in our implementation research studies.

SPECIFIC PRIORITIES

The overall goal of this research theme is to address SDG 3 and 5 by improving maternal, neonatal, child and adolescent health. We will do this specifically by conducting research in the following priority areas:

Goal	Priorities
<p>2.6 Improving maternal, newborn, child and adolescent health through improved understanding, especially of neglected issues, and innovations</p>	<p>Exploring timely detection and follow-up of high-risk pregnancies and testing approaches to promote timely and appropriate management through inventions and innovations</p>
	<p>Estimating adverse pregnancy outcomes (miscarriages, hypertensive disorders in pregnancy/pre-eclampsia/eclampsia, congenital malformations, etc.) and its associations with environmental exposures and developing appropriate interventions</p>
	<p>Continuing research to identify underlying causes and factors associated with stillbirths and preterm births, and developing/testing interventions across the continuum of care</p>
	<p>Improving measurement of causes of newborn deaths, identifying and addressing bottlenecks in implementation of existing solutions/interventions, including new interventions and innovations</p>
	<p>Assessing long-term benefits of early childhood psychosocial stimulation and developing and evaluating parenting and preschool interventions</p>
	<p>Developing innovative approaches to effectively reach adolescents with health information and services</p>
	<p>Identifying major health conditions affecting women, including mental health, and understanding and addressing determinants, causes and risk factors</p>

GOAL 2.7:**REDUCE MATERNAL, ADOLESCENT AND CHILDHOOD MALNUTRITION**

We will study biological and non-biological mechanisms underpinning maternal and childhood malnutrition. We will develop innovative interventions to prevent and treat these conditions and evaluate the efficacy, feasibility and scalability of new interventions.

THE GLOBAL CONTEXT

About two billion people suffer from malnutrition across the world. Malnutrition is an underlying cause of 45% of deaths that occur each year among children under five years of age. Globally, more than 150 million under-five children are affected by stunting or low-height for age. In some countries, as many as half of all adolescent girls and women of childbearing age are stunted, increasing the risk of poor foetal growth and low birth weight.

THE SITUATION IN BANGLADESH

In Bangladesh, more than half the population is affected by malnutrition. Severe acute malnutrition affects 450,000 children, while close to two million children have moderate acute malnutrition. Stunting affects 36% of children under-five, while a quarter of women are underweight, and around 15% are of short stature.

Half of all women suffer from anaemia, mostly nutritional in origin. Malnutrition is estimated to cost Bangladesh more than USD 1bn every year in lost productivity. (source of these stats needed).

OUR TRACK RECORD

We have worked extensively with international partners to understand the causes and implications of malnutrition and develop new products to prevent and treat malnutrition. We have published influential work on abnormalities in the gut microbiota of children with severe acute malnutrition and are now investigating how these abnormalities can be reversed.

We have influenced the global nutrition research agenda through our engagement with the WHO and the New York Academy of Sciences. In Bangladesh, we led the development of the National Nutrition Policy and advised on the country's Seventh Five-Year Plan.

Our recently published research shows that maternal stature, as well as size at birth, are important risk factors contributing to childhood malnutrition. Since the stature of current mothers cannot be improved, we are now focusing on increasing the height of adolescent girls. Community trials are planned to see the impact of interventions on increasing the height of adolescent girls – the future mothers – by a centimetre or two.

As more people globally are facing hunger and food insecurity, conventional approaches to research or programming may not work to control childhood malnutrition. Therefore, we have taken up cutting-edge research to evaluate the interaction of an unexplored yet significant potential frontier – the gut microbiota – and local foods. Our ambitious attempt is based on very preliminary but promising results emanating from our recently concluded pilot studies.

OUR APPROACH

We undertake a wide range of research, from basic laboratory studies to evaluations of preventive and treatment programme implementation to support policy development. Our research over the next Strategic Plan period will be informed by the SDG nutrition targets as well as the nutrition priorities outlined in the Global Nutrition Report and the National Nutrition Policy of Bangladesh. We identified the main challenges facing Bangladesh and the global South and undertook research and innovations to produce credible solutions.

Our research has already highlighted the factors responsible for and causes of undernutrition among children and women. Collecting inputs from needs-based clinical, basic, and community research, we will identify evidence to develop solutions that can be implemented at scale (e.g. the multi-country study

CHAIN study). This will be disseminated to policymakers and other stakeholders to ensure the implementation impacts maternal and child nutrition status.

Our current area of concern is under-nutrition, but we work collaboratively with our noncommunicable disease initiative, which is taking the lead on obesity-related nutrition, recognising that poor and unhealthy diets have created a dual problem of malnutrition and obesity. We benefit from cross-departmental collaboration on joint projects on water, sanitation, hygiene and nutrition; maternal nutrition; and treatment of pneumonia.

Specific priorities will include the development and evaluation of interventions for women and adolescent girls to prevent low birth weight, as well as studies to shape the design of new interventions to prevent and treat childhood wasting and stunting (e.g. DNA-aptamer technology).

SPECIFIC PRIORITIES

The overall goal of this research theme is to address Sustainable Development Goals 2 and 3 through the prevention and treatment of maternal and childhood malnutrition. We will do this specifically by conducting research with the goals of:

Goal	Priorities
2.7 Reducing maternal, adolescent and childhood malnutrition	Preventing and treating childhood malnutrition
	Achieving food security and improved micronutrient nutrition
	Improving adolescent nutrition
	Improving maternal nutrition to achieve optimal maternal and fetal health through basic research, intervention trials and implementation research
	Using multi-omics to understand nutritional as well as other problems and to come up with effective interventions for better outcomes
	Applying data mining and machine learning to demystify the complex link between nutrition, health and their interactions and to develop a reliable clinical decision support system

GOAL 2.8:

ENHANCE LABORATORY SERVICES AND SUPPORT GENOMICS

We will continue to develop our research infrastructure – for population-based, clinical, laboratory, and genomics-based research – to ensure it is aligned with our research objectives, remains internationally competitive and is financially sustainable.

Our laboratories, which include facilities for human, animal and microbial research, are among the best equipped in the region. As well as supporting icddr,b research, our internationally accredited service laboratories offer a wide range of diagnostic and analytical services to external clients, and part of the proceeds from the labs support our humanitarian and life-saving projects.

We will continue to invest in equipment and in our staff to maintain the quality of laboratory operations, to expand the range of services provided, and to ensure we utilise the latest technological advances. We are currently the only laboratory in Bangladesh to be accredited for 160 different laboratory tests under the ISO 15189 (quality) and ISO15190 (safety) standards. This makes us a highly

trusted destination for diagnostic testing of patients and study cohorts in Bangladesh.

Field sites are integral to our research, supporting large-scale clinical trials in urban and rural settings and a context in which to evaluate interventions. We run seven sites covering populations from 19,000 to 600,000 people. The Matlab field site, 50 km southeast of Dhaka, is the longest continuously running demographic surveillance system in the Global South, and an internationally recognised model for health and demographic surveillance sites. We will continue to leverage these well-established sites to address critical national and global public health issues and to ensure our researchers have access to population cohorts of the appropriate size and type.

SPECIFIC PRIORITIES

Goal	Priorities
2.8 Enhancing leadership position in providing quality laboratory diagnostic services to patients, researchers and organisations and in supporting genomics research	Ensuring easy access of icddr,b laboratory diagnostic services to people, researchers and organisations
	Sustaining leadership in quality diagnostic laboratory services in the country and in education and training of laboratory professionals within icddr,b and across the country
	Expanding and continuing the accreditation of icddr,b laboratory services through quality assurance and biosafety
	Adopting new and appropriate laboratory technologies
	Expanding genomic services in supporting researchers and diagnostics

GOAL 2.9:**IMPROVE HOSPITAL SERVICES AND CLINICAL RESEARCH**

Through our hospitals, we will continue to provide high-quality clinical services in diarrhoeal diseases, malnutrition and COVID-19. We will also continue to conduct and enhance our capacity for clinical research.

A HUMANITARIAN APPROACH

For the solace of the distressed and sick patients who belong to the lower socioeconomic stratum of the community, we deliver free of cost clinical care services through our hospitals located in Dhaka, Matlab and Teknaf.

A PLATFORM FOR RESEARCH

The hospitals facilitate the clinical research scientists and physicians to work closely with the patients for innovations in the clinical and public health domain. Disease surveillance and epidemiological research is also an important component of the work.

TRAINING PROFESSIONALS

Hands-on bedside training and academic discourse for clinical fellows, fellow nurses and other health care professionals are part of the range of activities we carry on in the hospitals. After completion of the training, these professionals fan out in the community, both national and international, equipped with knowledge and skills of effectively managing diarrhoeal diseases and allied illness.

COLLABORATIVE APPROACH

Diarrhoeal disease, COVID-19 and malnutrition prevention and cure in the FDMN camps are the key areas where we have joined hands with the GoB, UNICEF and other partners to meet this extraordinary humanitarian challenge. Internationally we participate in disaster response programs through the Global Outbreak Alert and Response Network (GOARN), providing technical expertise to fight epidemics of diarrhoea.

We will continue to provide clinical services at the hospital facilities, ensuring our patients receive the highest possible standards of care. The hospitals also provide a platform for the introduction of innovative new practices and act as a global showcase demonstrating what can be achieved in resource-poor settings.

Through a recently finished RCT, twice-daily doses of intravenous amoxicillin plus gentamicin have been proven to be more effective in severe pneumonia compared to the WHO-recommended four-times daily doses of intravenous ampicillin plus gentamicin. As this regime reduces nursing intervention times, hospital costs and the chance of nosocomial infection, last year, we adopted this new management.

We will strive to continually use our clinical facilities to demonstrate innovations in care to healthcare professionals from Bangladesh and provide training to other nations on how to adapt our approaches and innovations to their own healthcare systems.

SPECIFIC PRIORITIES

This goal supports Sustainable Development Goals 3 and 6 by providing timely and critical care in emergency crises and preventing the spread of life-threatening diseases.

Goal	Priorities
2.9.1 Strengthening clinical research	Increasing the efficiency of clinical care, reduction of morbidity and mortality through clinical research
2.9.2 Further improving clinical services	Further strengthening and improving the clinical services provided by the hospitals operated by icddr,b
2.9.3 Public Health and Humanitarian Emergencies	Developing prevention, rapid response and mitigation strategies for Public Health and Humanitarian Emergencies

GOAL 3: COLLABORATION

Collaborations are central to our work. We work with multiple governments, academic and NGO partners in Bangladesh, ensuring a strong focus on local health issues, and we have long-standing ties with scientific collaborators in leading research institutions worldwide.

Currently, we have a very strong collaboration with more than 100 Bangladeshi institutions and organisations comprised of Government ministries and agencies, NGOs, UN agencies working in Bangladesh, medical colleges, hospitals, research institutes and private organisations. We also have about 200 international collaborators, including leading research institutions, universities, INGOs and advocacy groups, and UN Agencies.

We are also members of a range of regional networks and work closely with partners across South Asia and the Global South.

GOAL 3.1:

IDENTIFY AND SET TARGET GROUPS FOR REGIONAL AND GLOBAL COLLABORATION

We will identify target groups that share our values and goals for research and other collaborations.

Collaboration with research groups with different but complementary areas of expertise to our own has historically enriched our work. We hope to continue and expand such collaborative work by systematically

targeting groups, including academic institutions, industry, funding agencies, national and international agencies, and non-government organisations that share common interests and values.

SPECIFIC PRIORITIES

Target groups include academic institutions, industry, funding agencies, national and international agencies, and non-government organisations that share common interests and values.

GOAL 3.2:**DEVELOP AND IMPLEMENT STRATEGIES FOR ENGAGING COLLABORATING GROUPS**

We will develop strategies to successfully engage identified target groups in research and other collaborations.

We will develop an engagement strategy to systematically identify and set up effective collaborations with identified target groups. The aims and results of collaborations are to be based upon mutually agreed-upon implementation frameworks.

SPECIFIC PRIORITIES

Engagement strategy to comply with existing rules; results of collaboration to be based upon mutually agreed upon implementation framework.

GOAL 4: REPUTATION AND BRANDING

GOAL 4.1: DEVELOP, REFINE, AND IMPLEMENT A COMMUNICATION STRATEGY

To make sure that our research findings have an impact on national and international policies, programmes, and practices, we will strengthen our collaborations and skill sets.

We are committed to ensuring that the research we generate reaches those who can utilise it, including fellow researchers, policymakers, implementation agencies and donors. We have a track record of publishing in high-quality and high-impact journals, influencing policy both in Bangladesh and at a global level, sharing our evidence and experience through training conducted in Dhaka and abroad.

To maximise the impact of our research, we will strengthen our relationships with policymakers and other research users, and actively engage them in priority-setting and research design, encouraging a theory of change approach. As well as continuing to publish our findings in appropriate high-impact scientific journals

in a timely manner, we will also develop briefings and dissemination events to communicate the policy implications of our work.

We will redesign our communication tools and strategies to increase impact and ensure that our findings are effectively disseminated to wider audiences. Through such activities, we will demonstrate to the public, donors and other key stakeholders the value of investing in our research and demonstrate different innovative approaches to healthcare challenges. We will communicate to potential partners (including policymakers, advocacy groups and implementers) the opportunities offered by collaborating with us, and by conducting research in Bangladesh.

SPECIFIC PRIORITIES

Goal	Priorities
4.1 Developing, refining and implementing a communication strategy	Improved communication of research findings through different local and international media and channels
	Increasing audience engagement through different owned media channels and exploring new avenues
	Enhancing the role of the Policy Translation Cell, developing policy advocacy instruments, and undertaking campaigns
	Strengthening internal communications to increase knowledge, awareness, and practices of staff on icddr,b's work, policies, and guidelines

GOAL 4.2: BECOME A RESEARCH INSTITUTE OF CHOICE

We will work to ensure that icddr,b is widely regarded as a high-performing research organisation with robust research platforms, opportunities, and resources, making it an attractive place of employment for the best professionals.

Since its inception as the Cholera Research Laboratory (CRL), icddr,b has been a global leader in public health and infectious disease research, developing breakthrough interventions such as ORS and conducting pioneering work to help reduce maternal and child mortality, among many others. We hope to continue this legacy while also ensuring that our past accomplishments and the quality and impact of our present work become more widely

known. This will help us attract the best professionals and scientists from around the world.

To keep abreast of the top global institutions, we need to provide state-of-the-art research infrastructure and resources that will enable our scientists to thrive. We will also develop institutional policies to promote teamwork, performance, excellence and to recruit effectively.

SPECIFIC PRIORITIES

Goal	Priorities
4.2 Striving to become a sought-after research institute for medical and public health professionals (a research institute of choice)	Attract professionals by providing them with robust research platforms and opportunities, and select the best
	Ensure icddr,b is a high-performing organisation that values teamwork, recognises and rewards performance, commitment and excellence
	Perform workforce assessment and succession planning to enable icddr,b to avail the right people with the right skills at the right place

GOAL 4.3: PROMOTE ORGANISATION EXCELLENCE, COHESIVENESS AND EFFICIENCY

We will continue to build the skills and competencies of all our people with a special focus on scientific staff, specifically developing young and mid-career researchers and supporting female researchers. We will foster a cohesive work environment while promoting operational efficiency.

The knowledge, skills and commitment demonstrated by our people enable us to achieve our research goals. Our highly skilled multidisciplinary scientific workforce is widely recognised as a distinctive asset. As well as our own researchers, we are committed to nurturing the next generation of public health leaders from the global South to develop people who can make real change happen.

Increasing gender, diversity and equality in all people-related activities is a priority, and we will continue to enhance our strength in this area. Working collaboratively across all areas of the organisation, we will maintain a strong and supportive organisation to continue our vital work.

Important priorities for the next three years include recruiting, retaining and developing mid-level scientists and supporting the career development of female researchers. We will also develop the leadership and management skills of principal investigators.

A high-performance environment that encourages learning and supports career progression is key to our ability to carry out high-quality research and promote the use of research evidence. Across all functions, the overarching focus will be on capacity building and increasing competencies of all staff and maintaining adherence to our values. We will also ensure our policies and processes are gender-sensitive and aim to position ourselves as a gender- and diversity-conscious organisation.

SPECIFIC PRIORITIES

Goal	Priorities
4.3 Promoting excellence in our work while valuing staff and fostering an inclusive organisational culture	Promoting ONE icddr,b by inculcating culture of cohesiveness (ethical work environment and shared goals)
	Ensuring diversity, equality and inclusion
	Promoting efficient work processes and procedures
	Ensuring our commitment towards Environmental, Social and Governance (ESG) goals
	Ensuring staff safety and welfare
	Ensuring people analytics and HR data to inform decision-making and help icddr,b become more efficient and effective at what it does
	Establishment of clear accountabilities by delegating responsibilities and decision-making, accompanied by robust compliance, checks and balances

GOAL 4.4:

ENSURE FINANCIAL SUSTAINABILITY

As well as carefully controlling expenditure, we will strengthen our fundraising strategy and maximise opportunities for income generation. We will continue to update and improve our business processes and governance regularly and modernise our operations to maximise efficiency and cost-effectiveness.

icddr,b has benefited from generous core support from a range of donors. However, we recognise that many donors are increasingly reluctant to make long-term funding commitments, preferring instead to support specific programmes.

Despite a highly competitive global funding environment, we have a strong track record of attracting funding and obtaining a wide range of research and implementation grants. Recognising new funding realities, we have taken steps to align all grants to our research strategy, to ensure total cost recovery, and to enable our investigators to budget accurately for in-house services and infrastructure costs.

As well as sustaining a pipeline of funding to support our focused research agenda including our humanitarian missions, South-South collaboration, we also need to generate income to cover our clinical and humanitarian services. In particular, we remain committed to supporting our hospitals in Dhaka and Matlab, despite the considerable financial obligation required to undertake this endeavour.

We have identified three key income streams: research funding, humanitarian fundraising, and increased income generation from services. We will develop a strategy for each of these income streams to ensure that we can achieve our research and humanitarian goals. By engaging in these efforts, we will increase income while simultaneously implementing on-going measures to control expenditure and enhance business efficiency.

New fundraising strategies have been developed for programme, corporate, government and philanthropic areas with an objective of securing USD 100M in total Endowment Funds as a long-term goal. Securing this

amount will enable us to use the interest amount for running two icddr,b hospitals in Dhaka and Matlab. We will build upon the success of recent fundraising efforts which resulted in the generous contribution of the American philanthropist Ms MacKenzie Scott and Bangladeshi industrialist Mr Muhammed Aziz Khan to the greater cause icddr,b's commitment for saving lives.

We will develop well-staffed, targeted and structured fundraising programmes for North America, Europe, Australia, the Gulf, and Asia. The plan will focus on supporting icddr,b's research agenda, driving South-South collaboration, and assisting clinical and humanitarian support.

Considerable improvements have been made to our system of governance and all areas of central management services since 2018, the start of our previous Strategic Plan 2019-2022. This has resulted in icddr,b being more efficient and effective in our research and service delivery, and we will continue to maintain and improve upon these significant achievements.

Effective and efficient business systems underpin our ability to compete for international funds and deliver high-quality research. Furthermore, as one of the region's leading research centres, it is essential that we operate by the standards expected of an international research organisation. In particular, we need to ensure that our policies, structures and procedures reflect external expectations of accountability and transparency.

Following a review and benchmarking of support services against international standards, we identified opportunities for streamlining and improving the use of technology for cost savings. Championed by a strengthened leadership team, we have been

implementing a programme to modernise in-house business processes, systems and practices.

We have begun the implementation of a new enterprise resource planning system to support streamlined business processes and more efficient reporting, utilising business intelligence and delivering effective budgetary management. We are designing further processes to ensure timely payments and collection, together with timely submission of invoices and donor financial reports.

We have embarked upon preparing for the implementation of IPSAS as the financial reporting framework. This will help improve financial accountability for icddr,b.

We are developing a comprehensive risk register in line with senior management and Internal Oversight to continue to strengthen internal mechanisms of financial oversight and accountability.

We are planning for balanced annual operating budgets for the future, which can be challenging and may require significant efforts in cost containment.

SPECIFIC PRIORITIES

Goal	Priorities
<p>4.4 Being financially sustainable, achieving balanced budgets on a consistent basis, breaking even over the course of time</p>	Ensure improved comprehensive budget planning using dissemination of templates and training of stakeholders
	Ensuring effective implementation of new ERP with maximum optimisation of all business processes
	Ensuring financial risk management and compliance to reduce audit findings and continue donor funding
	Ensuring IPSAS implementation
	Ensuring effective stakeholder management by providing quality services using SLAs and KPIs to measure progress
	Ensuring cost containment in core costs and maximising surplus in unrestricted funds
	Ensuring effective use of all assets (space, equipment) for providing efficient services, including utilisation of the new service building
	Updating comprehensive fundraising strategy to ensure continued maintenance of diversity of funding for research priorities and core elements, including hospital services

GOAL 4.5: BUILD TECHNOLOGICAL CAPACITY

We will improve the quality of IT services, work towards automation of organisation business processes, and ensure the security of data and information. When feasible and worthwhile, we will incorporate big data and machine learning-based solutions into our operational framework.

With large, modern high-throughput and genomic datasets and the processing power required to analyse them, research today is more reliant than ever on having access to robust computing. To that end, we will improve our IT services to better support researchers with the tools that they need to efficiently work with their data.

When curating and analysing large amounts of data, often on individuals' health and medical histories, privacy and security take on much greater significance. We will consult with experts to ensure data security while maintaining efficient access by researchers and collaborators.

SPECIFIC PRIORITIES

Goal	Priorities
4.5 Building capacity to harness technological advance in supporting public health research	Improve quality of IT service, monitoring and evaluation
	Leverage automation of organisational business processes with innovation
	Enhance the security of information to provide assurance to all stakeholders
	Take advantage of big data, data analytics, artificial intelligence and machine learning

STRATEGIC PLAN 2023-2027



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