

STRATEGIC PLAN 2019-2022



Solving public health problems through innovative scientific research

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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

Foreword

Dear friends and colleagues

We are delighted to share with you our new Strategic Plan, which sets out our research and organisational agenda for 2019 - 2022. It has been put together following extensive internal and external consultation, a review of our previous plan and a landscape analysis to identify new challenges. I would like to thank everyone who contributed for their insightful and constructive input.

As well as reviewing our past work and revisiting the needs of Bangladesh, we have taken into account new agendas such as the Sustainable Development Goals (SDGs) and the strategic goals of our core donors. Our new Strategic Plan is an evolution of our previous plan. We retain our focus on the key public health challenges facing Bangladesh and other low- and middle-income countries (LMICs), solutions to which will require high-quality research shaped by practical considerations.

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 low- and middle-income countries (LMICs). The most significant changes to our previous Strategic Plan are the inclusion of a gender-related research theme and a new goal linked to our clinical services and humanitarian emergency responses. All of these areas have long been important elements of our work, and their inclusion in the new plan is designed to raise their visibility and emphasise their strategic importance.

In 2017, icddr,b was awarded the Conrad N Hilton Humanitarian Prize, in recognition of our commitment to the development of innovative low-cost solutions to key public health challenges affecting LMICs. This commitment remains at the heart of our work, underpinning our contribution to the SDGs and a healthier and more prosperous future for all.

Moving forward, we will continue to increase our collaborations and share our knowledge to inform policies. Drawing on a 'theory of change' approach, evidenced by the fact that our research priorities are framed as public health outcomes, our strategy is based on a clear understanding of the key health challenges facing 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 in order to improve both the quality and quantity of life for those living in LMICs.

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

Professor John D. Clemens

Executive Director, icddr,b



About icddr,b

Originally founded in the 1960s, icddr,b was instrumental in the development of oral rehydration therapy—credited with saving 50 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 established through a Government of Bangladesh Ordinance as an international health research organisation charged with developing solutions suitable for scale-up in Bangladesh. Our current work, as set out in this Strategic Plan, maintains the fine traditions of icddr,b's origins. With our partners and core donors, we are developing low-cost solutions that work here and can be exported to other resource-poor settings.

Several factors have been central to our success:

- Being embedded within a low- and middle-income country, 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 of relevance in Bangladesh, but also improves the health and well-being of people living in comparable low- and middle-income countries.
- We have a commitment to translating research into policy and practice, and vast experience of disseminating our scientific evidence for use 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 inter-related 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 working 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, and laboratory research utilising the very 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 more than 200,000 indigent patients each year and setting the standard for treating infectious disease and malnutrition, among other conditions, in low- and middle-income countries (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. In its short history, Bangladesh has undergone a health revolution, achieving significant reductions in child and maternal mortality. 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 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 now is 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. To secure supplies from the oral cholera vaccine global stockpile, we worked with Bangladesh's Directorate General of Health Services to develop an application to the World Health Organisation's International Coordinating Group. Timely distribution of the vaccine prevented a cholera outbreak among the Forcibly Displaced Myanmar Nationals and a local population of nearly one million people. Our well-developed network has enabled us to help prevent a humanitarian disaster in Cox's Bazar through a mass oral cholera vaccination campaign.

We are also 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 2015–2018

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

FOCUSED RESEARCH AGENDA

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

GLOBAL RECOGNITION

Our work was commended by former UN Secretary General Ban-Ki-moon in 2016 and we were awarded the Conrad N. Hilton Humanitarian Prize in 2017.

FUNDING SUCCESS

We secured USD 186m in competitive grants, alongside core support of USD 37.6m.

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 dangerously ill infants with severe pneumonia.

COMBATING NIPAH VIRUS

We have developed innovative practical tools and community engagement approaches to prevent the spread of Nipah virus through contaminated date palm sap.

MALNUTRITION AND THE MICROBIOME

We contributed to influential studies demonstrating how malnutrition disrupts development of the gut microbiome, with long-term implications for health.

READY-TO-USE THERAPEUTIC FOOD (RUTF)

We created a cost-effective RUTF for treatment of children with severe acute malnutrition in Asia.

IMPROVING PAEDIATRIC SEPSIS CARE

Our work showed that the quality of hospital care for paediatric sepsis can be significantly improved by task-shifting and protocolised management.

AUTISM

We have conducted award-winning research on the mental health issues experienced by mothers of children with autism in Bangladesh.

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.

TB 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.

STAFF DEVELOPMENT

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

LABORATORY SERVICES

Our internationally accredited laboratory team carried out more than 4.5 million tests, generating income to support our hospital services.

CLINICAL SERVICES

We treated more than 625,000 patients at our hospitals and treatment centres in Dhaka and Matlab.

HUMANITARIAN RESPONSES

We played a pivotal role in vaccination and disease-control campaigns for more than 900,000 Forcibly Displaced Myanmar Nationals and continue to support the population in Cox's Bazar. We supported humanitarian missions in Ethiopia, Iraq, Syria, South Sudan, Yemen and Mozambique to assist in the management of cholera outbreaks and in training health professionals.

BUSINESS EFFICIENCY

We have updated our IT systems and management procedures, and automated multiple business processes to enhance our business efficiency.

STRATEGIC GOALS 2019-2022

**We aim to be the leading centre of public health research excellence
and innovation in the global South**

GOAL 1 MAINTAIN A FOCUSED RESEARCH STRATEGY

We will continue to focus our research on areas of unmet need, developing high-quality research programmes addressing the key health challenges of Bangladesh and the global South.

GOAL 2 DEVELOP AND PROMOTE USE OF INNOVATIONS FOR BANGLADESH AND THE GLOBAL SOUTH

We will develop, evaluate and promote the implementation of innovations – products, tools and innovative models of service delivery – tailored to the needs of Bangladesh and other low-resource settings.

GOAL 3 PROVIDE CLINICAL SERVICES AND SUPPORT HUMANITARIAN RESPONSES

Through our hospitals, we will continue to provide high-quality clinical services for diarrhoeal disease and malnutrition, and also provide advice and training in humanitarian emergency response situations.

GOAL 4 INVEST IN OUR RESEARCH PLATFORMS AND FIELD SITES

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

GOAL 5 INCREASE THE VISIBILITY AND IMPACT OF OUR RESEARCH EVIDENCE

We will build skills and partnerships to ensure that our research evidence has impact on national and international policies, programmes and practices for improved health.

GOAL 6 INVEST IN OUR PEOPLE

We will continue to build the skills and competencies of all our people, with a special focus on developing our young and junior scientific staff, mid-career researchers, and supporting female researchers.

GOAL 7 IMPROVE ORGANISATIONAL EFFICIENCY AND COST-EFFECTIVENESS

We will continue to modernise our operations to maximise efficiency and cost-effectiveness.

GOAL 8 ENSURE FINANCIAL SUSTAINABILITY

As well as carefully controlling expenditure, we will strengthen our fundraising strategy and maximise opportunities for income generation.

MAINTAIN A FOCUSED RESEARCH STRATEGY

We will continue to focus our research on areas of unmet need, developing research programmes addressing the key health challenges of the global South.

This plan builds on the 2015-18 strategy and its successful implementation of a more focused research strategy. This has increased our knowledge and delivered impactful research addressing the most pressing and intractable health concerns of the global South. We are engaged with the Government of Bangladesh as well as actively sharing our evidence and experience with other low- and middle-income countries to ensure that our research benefits people in the greatest need. Our research collaborations are global; we work with other world-leading institutions, carrying out cutting-edge research across our portfolio. Together, we are achieving our mission of creating innovative scientific solutions and contributing to our vision of a world in which more people survive and live healthy lives.

Six priorities will form the focus of this plan (page 13). Gender equality and sexual and reproductive rights, are included as a new priority in this Strategic Plan. We already have significant expertise and experience in this area, and its inclusion highlights our commitment to gender-related research and reflects the importance of gender in the Sustainable Development Goals and our core donors' priorities.

We continue to build capacity in our two research initiatives, in areas that are highly relevant to Bangladesh and other low-income countries – climate change and non-communicable diseases.

Within each priority area, research will be conducted across the continuum of:

- **Discovery** – research that defines the nature and causes of a problem;
- **Development** – research that develops solutions or a response to a problem; and
- **Delivery** – research focusing on implementation, scale-up and/or sustainability of interventions in public health or health care practice.

While continuing to conduct research in Bangladesh, we are developing more collaborations with research institutions in the global South, leading and participating in research studies in South Asia and other low-income countries.

We have made excellent progress in the updating of our scientific governance and research administration systems, including research ethics oversight. Our scientific advisers have played a key role in the development of our 2019–22 research agenda.

RESEARCH PRIORITIES:

Reducing maternal, neonatal and child mortality and improving the well-being of women, children and adolescents

Preventing and treating maternal and childhood malnutrition

Detecting and controlling enteric and respiratory infections

Detecting and controlling emerging and re-emerging infections

Achieving universal health coverage

Achieving gender equality and promoting sexual and reproductive health and rights

RESEARCH INITIATIVES:

Examining the health consequences of and adaptation to climate change

Preventing and treating non-communicable diseases

RESEARCH PRIORITIES:

REDUCING MATERNAL, NEONATAL AND CHILD MORTALITY AND IMPROVING THE WELL-BEING OF WOMEN, CHILDREN AND ADOLESCENTS

We will develop and evaluate new interventions and carry out implementation research to enhance the coverage, quality and equity of interventions to reduce the physical and mental health burden on women, infants, children, and adolescents.

THE GLOBAL CONTEXT

Every two minutes, a woman somewhere in the world will die from a pregnancy-related complication; 70% of these deaths are caused by five conditions and these deaths are potentially preventable. Each year, an estimated 5.4 million children under-five die globally; 2.5 million of them are neonates. Another 2.6 million pregnancies end in stillbirths.

Neonatal health, child development, and maternal health are inextricably linked. Improving women's health and the 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 have

lasting impact on their health and well-being. Biological and social role changes make adolescence an additional vulnerable stage of life.

THE SITUATION IN BANGLADESH

Despite remarkable progress, mortality rates among mothers and newborns in Bangladesh remain 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 is usually low and the quality of services is generally poor.

OUR TRACK RECORD

We have a long history of developing 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, zinc to control diarrhoea, and birthing mats to manage post-partum haemorrhage. 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.

OUR APPROACH

Our work spans the full spectrum of research, including epidemiological studies (e.g. indoor air pollution), operations and implementation research, clinical trials (e.g. HEV, HPV, RSV vaccination), 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 as well as adolescent health and well-being.

The main causes of maternal, neonatal and child mortality and morbidity are now well understood, and in many cases effective interventions have been developed. A key challenge is to promote the implementation of evidence-based approaches. 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.

HEV: Hepatitis E virus
HPV: Human papillomavirus
RSV: Respiratory syncytial virus

RESEARCH GOALS

The overall goal of this research theme is to address Sustainable Development Goals 3 and 5 through the reduction of maternal, neonatal and child mortality. We will do this specifically by conducting research with the goals of:

- Evaluating approaches to better the health and well-being of adolescents, and to improve the delivery of these interventions.
- Assessing existing strategies and developing new strategies to improve adolescent and maternal mental health.
- Assessing existing strategies and developing new strategies for early detection and management of major maternal complications and prevention of stillbirths.
- Conducting implementation research to improve the delivery, quality and coverage of interventions addressing major maternal complications and stillbirths.
- Assessing existing strategies and developing new strategies for early detection and management of life-threatening newborn conditions.
- Conducting implementation research to promote the delivery, quality and coverage of interventions addressing direct and underlying causes of newborn deaths.
- Developing new products and interventions addressing the major causes of childhood deaths.
- Increasing access and coverage of good quality early childhood development at scale.
- Conducting implementation research to improve the delivery, quality and coverage of interventions addressing the major causes of child mortality and morbidity.

Reducing maternal, neonatal and child mortality and improving the well-being of women, children and adolescents

| Research Goals | Targets by 2022 |
|---|--|
| Evaluating approaches to improve health and well-being of adolescents, and to improve the delivery of these interventions. | <p>Conducting exploratory studies to understand critical adolescent health issues requiring further research.</p> <p>Conducting exploratory studies to understand opportunities for intervening on adolescent health issues through secondary schools.</p> <p>Designing and implementing a national survey on health and well-being of adolescents.</p> |
| Assessing existing strategies and developing new strategies for improving adolescent and maternal mental health. | <p>Designing, developing and testing innovative approaches for improving maternal mental health.</p> <p>Evaluating interventions for improving adolescent mental health with a focus on postpartum depression among adolescents.</p> |
| Assessing existing strategies and developing new strategies for early detection and management of major maternal complications and prevention of stillbirths. | <p>Conducting implementation research to improve referral and management of pregnancy-induced hypertensive disorders. <i>(Potential for testing outside Bangladesh)</i></p> <p>Developing and evaluating innovative strategies to manage postpartum haemorrhage. <i>(Potential for testing outside Bangladesh)</i></p> <p>Identifying, developing, and assessing strategies to reduce unnecessary caesarean sections.</p> <p>Designing and testing interventions to manage chronic obstetric morbidities including fistula, genital prolapse, and urinary incontinence.</p> <p>Designing, developing and testing innovative approaches for reducing intrapartum stillbirths.</p> |
| Conducting implementation research to improve the delivery, quality and coverage of interventions addressing major maternal complications and stillbirths. | <p>Conducting implementation research studies to improve quality of care in maternal health services in the public sector across the continuum of care, with a focus on ensuring adequate management of maternal complications and an emphasis on improved maternal outcomes and prevention of stillbirths.</p> <p>Conducting implementation research studies to improve the quality and coverage of antenatal care services.</p> <p>Evaluating the quality of care in private facilities to ensure adequate management of maternal complications, delivery and postnatal care.</p> <p>Conducting exploratory studies on how to strengthen government regulation to improve maternal care at private facilities.</p> <p>Establishing an information system to measure and track maternal and newborn health service readiness, intervention coverage, and mortality at a national level.</p> <p>Testing innovations to improve coverage of maternal vaccination (e.g. hepatitis E virus, human papillomavirus, respiratory syncytial virus, influenza, rubella).</p> |

| Research Goals | Targets by 2022 |
|---|--|
| <p>Assessing existing strategies and developing new strategies for early detection and management of life-threatening newborn conditions.</p> | <p>Continuing research to evaluate the biological pathways (e.g. maternal bacteriuria, immune responses, inflammation, vaginal infections/ colonisation) leading to preterm birth.</p> <p>Developing and testing tools to assess newborn service readiness and quality of care in Bangladesh.</p> <p>Conducting research studies to expand our understanding of the effect of indoor air pollution on adverse pregnancy outcomes (e.g. stillbirth, preterm and perinatal death) and to measure benefits of strategies to reduce exposure to indoor air pollution.</p> |
| <p>Conducting implementation research to improve the delivery, quality and coverage of interventions addressing direct and underlying causes of newborn deaths.</p> | <p>Conducting implementation research studies to support the scale-up of management of neonatal sepsis, provision of kangaroo mother care for premature newborns and administration of antenatal corticosteroids during premature labour. <i>(Potential for testing outside Bangladesh)</i></p> <p>Assessing the existing documentation practices (i.e. recording and reporting) at public facilities related to key newborn health interventions, and identifying strategies to improve measurements through routine systems.</p> <p>Conducting an assessment of the quality of newborn care practices in private facilities to help improve these practices.</p> |
| <p>Developing new products and interventions addressing the major causes of childhood deaths.</p> | <p>Developing, designing and evaluating interventions for each of the following:</p> <ul style="list-style-type: none"> • Preventing drowning • Reducing health hazards for children from household air pollution • Improving coverage of the use of zinc at scale for diarrhoea management. |
| <p>Increasing access and coverage of good quality early childhood development at scale.</p> | <p>Testing the feasibility of introducing early childhood development (ECD) measurement tools in public sector health facilities.</p> <p>Developing and testing strategies to deliver ECD stimulation interventions through public sector hospitals and facilities.</p> |
| <p>Conducting implementation research to improve the delivery, quality and coverage of interventions addressing the major causes of child mortality and morbidity.</p> | <p>Assessing the existing documentation practices in public health systems related to key child health interventions, and identifying strategies to improve measurement and tracking of intervention coverage through routine systems.</p> <p>Conducting at least one implementation research study inside and outside Bangladesh for each of the following:</p> <ul style="list-style-type: none"> • Improving outpatient management of common childhood illnesses (e.g. digitisation of service protocols, the introduction of pulse oximetry). • Improving inpatient management of sick children, particularly by introducing ‘protocolised management’. • Improving the quality of healthcare for sick children in private hospitals. |

PREVENTING AND TREATING MATERNAL 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

Two billion people suffer from malnutrition across the world. Malnutrition is an underlying cause of 45% deaths that occur each year among under-five children.

More than 150 million children under-five worldwide are affected by stunting. In some countries, as many as half of all adolescent girls and women of child-bearing 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.

OUR TRACK RECORD

We have worked extensively with international partners to understand the causes and implications of malnutrition and to 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 World Health Organisation (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 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.

With greater numbers of people globally facing hunger and food insecurity, more 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 upon very preliminary but promising results emanating from 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 pursue research and innovations to produce credible solutions.

Our research has already highlighted the factors responsible for and causes of under-nutrition among children and women. Collecting inputs from needs-based clinical, basic, and community research, we will identify evidence to develop solutions which can be implemented at scale (e.g. the multi-country study Childhood Acute Illness and Nutrition (CHAIN) study). This will be disseminated to policymakers and other stakeholders to ensure that implementation will have the desired impact on maternal and child nutrition status.

Our current area of concern is under-nutrition, but we work collaboratively with our non-communicable 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 in public healthcare facilities.

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).

RESEARCH GOALS

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:

- Improving knowledge of acute malnutrition through basic research.
- Simplifying treatment of acute malnutrition through better insight and intervention trials.
- Understanding the mechanisms underpinning stunting to improve management.
- Improving maternal nutrition to enhance pregnancy weight gain and perinatal outcomes (e.g. birth weight).
- Improving dietary diversity and nutritional status of adolescents, particularly girls.

Preventing and treating maternal and childhood malnutrition

| Research Goals | Targets by 2022 |
|---|---|
| <p>Improving knowledge of acute malnutrition through basic research.</p> | <p>Expanding the existing use of DNA-aptamer technology (SOMAscan) to identify 1300 proteins in plasma and urine that can lead to improved treatment of acute malnutrition.</p> <p>Studying immune phenotypes of circulating cells in children with severe acute malnutrition (SAM) and moderate acute malnutrition (MAM) compared with normal children.</p> <p>Identifying optimum gut microbiota directed foods for treating childhood SAM and MAM through translational and reverse translational studies.</p> <p>Identifying invasive fungal infections in severely malnourished children with and without primary immunodeficiency.</p> <p>Investigating the double burden of malnutrition in slum settlements.</p> |
| <p>Simplifying treatment of acute malnutrition through better knowledge and intervention trials.</p> | <p>Studying dietary management of prolonged and persistent diarrhoea and malnutrition.</p> <p>Investigating the outcome of treatment of children with acute malnutrition and illness (e.g. the CHAIN study).</p> <p>Conducting clinical trial of microbiota directed foods in the treatment of MAM and post-SAM/MAM.</p> <p>Conducting pilot trial of probiotic with and without prebiotic in young infants with SAM.</p> |
| <p>Understanding the mechanisms underpinning stunting for better management.</p> | <p>Validating non-invasive biomarker signature(s) of environmental enteric dysfunction (EED) with small intestinal biopsy.</p> <p>Developing and validating a system for histological scoring of EED.</p> <p>Studying body composition in stunted children to explore the long-term role of nutrition interventions.</p> <p>Studying immune cells in EED and stunting using flow cytometry (FACSARIA Fusion) and mass cytometry (CyTOF).</p> <p>Understanding mechanisms of stunting through transcriptomics.</p> <p>Assessing the role of small intestinal bacterial overgrowth in the pathogenesis of stunting.</p> <p>Investigating coeliac disease as a cause of growth faltering in Bangladesh.</p> <p>Studying egg and milk for improved linear growth of children.</p> <p>Improving linear growth by treating EED with antibiotics (e.g. the ABCD trial).</p> <p>Measuring impact of nutrition interventions on linear growth and feeding practices of under-two children in rural Bangladesh.</p> <p>Studying protein-plus trial of egg, egg white and azithromycin to prevent childhood stunting.</p> <p>Evaluating multiple micronutrient powder to prevent stunting.</p> |

| Research Goals | Targets by 2022 |
|---|---|
| <p>Improving maternal nutrition to improve pregnancy weight gain and perinatal outcomes e.g. birth weight.</p> | <p>Measuring the effect of nutrition counselling and the use of a wearable device to improve nutritional status and detect pregnancy-induced hypertension at an earlier stage to reduce intrauterine growth retardation.</p> <p>Evaluating the effect of size at birth on nutritional status, bone maturity and development among 24–36-month-old children.</p> <p>Strengthening baby-friendly hospital initiatives in hospitals and clinics for improving breastfeeding practices among infants delivered by caesarean section.</p> <p>Mapping maternal nutrition interventions in Bangladesh.</p> |
| <p>Improving dietary diversity and nutritional status of adolescents, particularly girls.</p> | <p>Conducting a randomised controlled trial of behaviour change communication through secondary schools to improve dietary diversity of adolescent girls.</p> <p>Assessing nutritional status of adolescents through the Adolescent Health Survey.</p> |

DETECTING AND CONTROLLING ENTERIC AND RESPIRATORY INFECTIONS

We will generate a better understanding of key disease-causing organisms and host immune responses to develop and evaluate low-cost potentially scalable preventive and therapeutic interventions.

THE GLOBAL CONTEXT

The world is becoming increasingly urban with most of this growth taking place in urban slums in low- and middle-income countries (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 lacking 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. Children less than five years of age experience an estimated 950 million episodes of diarrhoea and 120 million episodes of pneumonia every year, resulting in approximately 1.5 million deaths worldwide.

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 global 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 socio-economic 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.

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 history of developing effective interventions in order to prevent and treat diarrhoeal diseases and respiratory infections. We developed and proved the value of oral rehydration solution (ORS) for the treatment of paediatric diarrhoea, and later showed the positive impact of zinc supplementation of ORS. ORS has been estimated to have saved over 50 million lives worldwide. Our clinical trials of several key vaccines (including cholera, rotavirus, pneumococcal, Hib, tetanus, polio and influenza vaccines) generated evidence that has influenced global policy, including WHO recommendations and Bangladesh's national immunisation programme.

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 in order to address both immediate needs and new emerging pathogenic threats. Moreover, we will focus our efforts on meeting the demands of disadvantaged populations (e.g. urban slum dwellers and rural poor) as this is where the greatest burden of disease resides and the source of future epidemics (e.g. Nipah virus). We will also expand our research portfolio on respiratory infections (e.g. influenza, RSV vaccination of mothers, and prevention with monoclonal antibodies in infants), microbiomics, diagnostics, mathematical modelling, 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 in order 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.

RESEARCH GOALS

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

- Determining the mechanisms governing the ecology of enteric and respiratory pathogens in order to provide leads for new preventative and therapeutic interventions.
- Elucidating immune responses and protective mechanisms against key enteric and respiratory pathogens.
- Identifying new vaccine antigens and adjuvants to provide leads for development of improved vaccines.
- Characterising disease burden and human susceptibility for improved targeting of interventions.
- Developing and evaluating improved diagnostics to facilitate disease detection and treatment.
- Developing, evaluating and scaling up the use of vaccines of public health importance.
- Developing and evaluating non-vaccine preventative and therapeutic interventions.
- Exploring the role of the microbiome in response to natural infection and vaccination.
- Assessing environmental exposures and testing novel interventions.

Detecting and controlling enteric and respiratory infections

| Research Goals | Targets by 2022 |
|---|---|
| Determining the mechanisms governing the ecology of enteric and respiratory pathogens to provide leads for new preventative and therapeutic interventions. | <p>Studying ecology of <i>Vibrio cholerae</i> and associated phages and role in cholera epidemics.</p> <p>Studying <i>V. cholerae</i> growth response to determine mechanisms for control of transmission.</p> <p>Identifying genetic markers of antimicrobial resistance and virulence determinants in <i>V. cholerae</i> and other major enteric pathogens.</p> <p>Determining phylodynamics of clinical and environmental <i>V. cholerae</i> strains by genome-wide association studies.</p> <p>Studying antigenic drift and shift in influenza viruses.</p> |
| Elucidating immune responses and protective mechanisms against key enteric and respiratory pathogens. | <p>Examining the role of innate and adaptive immune responses in natural cholera infection and vaccination.</p> <p>Evaluating immune response in typhoid disease and vaccination.</p> <p>Determining the role of dMLT and colonisation factors in cellular responses in enterotoxigenic <i>E. coli</i> (ETEC) disease and vaccination.</p> <p>Evaluating epidemiology of respiratory syncytial virus (RSV) disease burden.</p> |
| Identifying new vaccine antigens to provide leads for development of improved vaccines. | <p>Evaluating novel antigens (e.g. CdtB, HlyE) to measure immune responses in typhoid fever and apply for development as diagnostic tools.</p> <p>Studying different antigens (OSP, sialidase) for measuring immune responses in cholera and application for functional studies and diagnosis.</p> <p>Studying antigenic pattern of RSV to determine effectiveness of existing vaccines.</p> <p>Studying antigenic pattern of <i>Streptococcus pneumoniae</i> strains to determine effectiveness of existing vaccines.</p> |
| Characterising disease burden and human susceptibility for improved targeting of interventions. | <p>Estimating cholera burden by carrying out nationwide surveillance.</p> <p>Determining hotspots of cholera using geospatial mapping.</p> <p>Measuring the burden of enteric fever and associated antimicrobial resistance.</p> <p>Preparing typhoid investment case for successful implementation of Vi polysaccharide conjugate vaccine.</p> <p>Determining disease burden due to vaccine-preventable enteric diseases.</p> <p>Studying the epidemiology of respiratory pathogens causing influenza-like illness in Bangladesh.</p> |

| Research Goals | Targets by 2022 |
|---|--|
| <p>Developing and evaluating improved diagnostics to facilitate disease detection and treatment.</p> | <p>Evaluating rapid diagnostic tests for cholera and typhoid for disease burden studies.</p> <p>Developing a point-of-care device for rapid detection of <i>Shigella</i> in stool sample and its susceptibility to ciprofloxacin and azithromycin.</p> <p>Developing short target sequence-based diagnostics for screening respiratory pathogens.</p> <p>Evaluating BioFire FilmArray technology in resource-limited setting for quick diagnosis of a panel of respiratory pathogens.</p> |
| <p>Developing, evaluating and scaling-up the use of vaccines of public health importance.</p> | <p>Evaluating the safety and immunogenicity of second generation oral inactivated ETEC vaccine.</p> <p>Evaluating effectiveness of oral cholera vaccines produced locally in Bangladesh.</p> <p>Evaluating effectiveness of hepatitis E virus vaccine among rural women of child-bearing age.</p> <p>Evaluating safety and immunogenicity of human papillomavirus vaccine.</p> <p>Studying safety, immunogenicity and efficacy of RSV vaccine in pregnant women to prevent disease in infants and mothers.</p> <p>Determining intestinal and humoral immunity of monovalent oral poliovirus vaccine type 1 (mOPV1) when administered with and without fractional inactivated poliovirus vaccine (fIPV).</p> <p>Determining poliovirus type 2 seroprevalence with use of fractional inactivated poliovirus vaccine (fIPV) delivered through routine immunisation services in Bangladesh.</p> <p>Assessing poliovirus type 2 immunogenicity of one and two dose schedule with IPV and fIPV when administered at 9-13 months of age in rural Bangladesh.</p> <p>Assessing the impact of a Vi polysaccharide conjugate vaccine in preventing typhoid infection among Bangladeshi children.</p> <p>Initiating plans for implementation of Vi polysaccharide conjugate vaccine for use in high-risk population.</p> <p>Determining the safety and immunogenicity of SHIGETECVAX, a combined vaccine against <i>Shigella</i> and ETEC diarrhoea, in descending age groups.</p> <p>Evaluating safety and immunogenicity of conjugate <i>Shigella</i> vaccine (SF2a-TT15) in descending age groups.</p> <p>Evaluating immune persistence in response to polio vaccines.</p> <p>Studying the booster effect of trivalent influenza vaccine in preventing influenza among children and women.</p> <p>Determining immune responses to influenzae vaccine of pandemic potential in occupationally exposed healthy adults (poultry workers).</p> |

RESEARCH PRIORITIES

| Research Goals | Targets by 2022 |
|--|--|
| <p>Developing and evaluating non-vaccine preventative and therapeutic interventions.</p> | <p>Evaluating low-cost water-sanitation and hygiene interventions in controlling enteric and respiratory infections.</p> <p>Assessing the clinical efficacy of a reprofiled drug, auranofin, for treatment of giardiasis and amoebiasis.</p> <p>Evaluating monoclonal antibody for treatment of Guillain-Barré syndrome in a phase I trial.</p> <p>Determine therapeutic potential of a small drug inhibitor in enteropathogenic <i>Escherichia coli</i> (EPEC) infection in a rabbit model.</p> <p>Studying analogues of entinostat as candidate for host-directed therapy in rabbit model of ETEC infection.</p> |
| <p>Exploring the role of microbiome in response to natural infection and vaccination.</p> | <p>Evaluating the association of the microbiome with <i>V. cholerae</i> infection.</p> <p>Studying association of the microbiome with <i>S. Typhi</i> infection in patients.</p> <p>Determining the effect of nutritional status and prevailing gut microbiota on the response to EPI vaccines.</p> <p>Studying the role of WASH intervention on the commensal microbiota.</p> |
| <p>Assessing environmental exposures and testing novel interventions.</p> | <p>Determining feasibility, acceptability and impact of an integrated intervention package (WASH, nutrition, child stimulation) to reduce morbidity due to infectious diseases.</p> <p>Measuring the impact of air pollution on susceptibility to respiratory infections and exposure reduction through a comparison of the respiratory and cardiovascular health of people living in a villages where one or more fixed chimney brick kilns are in operation with people living in villages without any brick kilns.</p> <p>Assessing health benefits of dietary approach in reducing episodes of respiratory illness through enhanced arsenic excretion.</p> |



DETECTING AND CONTROLLING EMERGING AND RE-EMERGING INFECTIONS

We will work with partners in Bangladesh and internationally to detect, characterise and respond to emerging and re-emerging infectious disease threats.

THE GLOBAL CONTEXT

The global history of emerging or re-emerging infectious diseases (EIDs) shows that, on average, they have appeared about once a decade since 1940. Recently, however, the time between pandemics has become shorter, as evident from severe acute respiratory syndrome (SARS) in 2003, influenza A H5N1 (bird flu) in 2007, H1N1 (swine flu) in 2009, Middle East respiratory syndrome (MERS) in 2012, and Ebola virus in 2014. 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 chikungunya virus, West Nile virus and dengue virus. These three arboviruses alone account for morbidity and mortality tolls that far exceed those of the combined rates of SARS, Ebola

and MERS-CoV. Thus, EID discovery efforts need to be 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 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 a 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 from 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 SITUATION IN BANGLADESH

Dengue is common in Dhaka and an emerging risk in rural areas. Nipah virus causes yearly

outbreaks of encephalitis in Bangladesh, with more than a 75% case fatality. Human-to-human transmission is prevalent in Bangladesh and novel paramyxoviruses continue to emerge. Avian influenza is endemic in Bangladeshi poultry, but has thus far caused only mild illness in humans. Yearly outbreaks of anthrax occur in ruminants such as cattle, with some human infections.

Behaviour change interventions to prevent cross-species transmission are often hampered by local poverty and food insecurity. Multidrug-resistant tuberculosis (MDR-TB) is common in Bangladesh, and the infrastructure to treat MDR-TB is limited. The global spread of antimicrobial resistance, some originating from Bangladesh and other parts of South Asia, has caused international concern. In recent years multiple zoonotic influenza A strains (H5N1, H5N6, H7N9, H10N8) with pandemic potential have emerged in humans, but the current quadrivalent influenza vaccine does not cover their serotypes. The US Centers for Disease Control and Prevention (CDC) ranks H7N9 as the flu strain with the greatest potential to cause a global pandemic.

OUR TRACK RECORD

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. 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 Institute of Epidemiology, Disease Control and Research of 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.

We are also forming a new partnership with the Coalition for Epidemic Preparedness Innovations in order to trial new vaccines under development for Nipah virus and to examine the immunogenetic profile of survivors.

OUR APPROACH

Over the next Strategic Plan period, we will maintain our focus on detection and response, building on our existing partnerships and surveillance capabilities. Priorities will include developing a better understanding of antimicrobial resistance nationally, evaluating Nipah virus diagnostics, vaccines and therapeutics, and adopting a One Health approach to investigate and limit the impact of infections spanning the human-animal interface.

RESEARCH GOALS

The overall goal of this research theme is to address Sustainable Development Goal 3 through the detection and control of emerging and re-emerging infections. We will do this specifically by conducting research with the goals of:

- Estimating disease burden, exploring transmission dynamics and identifying risk factors at the human-animal interface through a One Health approach.
- Testing and implementing new vaccines, diagnostics and behavioural interventions.
- Evaluating new treatments for human disease.
- Conducting implementation research to scale up new preventative and therapeutic interventions.
- Assessing the burden of antimicrobial resistance in humans, animals and the environment, elucidating mechanisms of resistance, and designing preventive interventions.
- Determining the burden of vector-borne diseases to inform control and prevention.
- Developing and implementing sustainable infection control measures in healthcare facilities.
- Developing evidence-based prevention packages for vulnerable populations at risk of acquiring blood-borne and sexually transmitted pathogens.

Detecting and controlling emerging and re-emerging infections

| Research Goals | Targets by 2022 |
|--|--|
| <p>Estimating disease burden, exploring transmission dynamics and identifying risk factors in human-animal interface through a One Health approach.</p> | <p>Assessing disease burden and identifying key vulnerable populations, geographic localisation, and transmission dynamics for influenza.</p> <p>Determining the association between influenza and acute myocardial infarction and bronchial asthma.</p> <p>Determining the distribution, risk factors and disease burden of extra-pulmonary tuberculosis (TB) in selected hospitals of Dhaka.</p> <p>Assessing knowledge, attitude and practices of livestock farmers about animal anthrax vaccination.</p> <p>Assessing raw date palm sap consumption practices across the country.</p> <p>Identifying pathogens in acute febrile illness.</p> <p>Identifying the aetiology of under-five deaths through child health and mortality prevention surveillance.</p> |
| <p>Testing and implementing new vaccines, diagnostics, and behavioural interventions.</p> | <p>Assessing behavioural interventions to prevent Nipah virus transmission.</p> <p>Conducting human trials of Nipah vaccine and testing Nipah diagnostics.</p> <p>Determining the feasibility of using stool as an alternative specimen to diagnose TB in children using Xpert MTB/RIF assay.</p> <p>Identifying biomarkers of childhood TB in blood and urine.</p> <p>Testing apps for rapid TB diagnosis following clinical prediction rule.</p> <p>Developing and evaluating interventions to reduce the transmission of zoonotic diseases.</p> |
| <p>Evaluating new treatments for human disease.</p> | <p>Determining the feasibility of using digital treatment monitoring tools to improve treatment outcome for TB.</p> <p>Determining the effect of diabetes mellitus on clinical and radiological manifestation as well as treatment outcomes for TB and on host immunity to <i>M. tuberculosis</i>.</p> <p>Determining the role of pharmacotherapeutics in predicting treatment outcomes of severe forms of TB.</p> <p>Determining the role of Quantiferon TB Gold In-Tube test and heparin binding haemagglutinin assay in predicting treatment outcomes of TB.</p> |
| <p>Conducting implementation research to scale up new preventative and therapeutic interventions.</p> | <p>Scaling up private-public partnerships for TB detection and treatment in urban areas.</p> <p>Improving TB notification involving private sector by introducing digital notification system.</p> |

| Research Goals | Targets by 2022 |
|--|--|
| <p>Assessing the burden of antimicrobial resistance in human, animal and environmental health and elucidating the mechanism of resistance and preventive interventions.</p> | <p>Estimating the prevalence of drug-resistant malaria in endemic areas of Bangladesh.</p> <p>Assessing use of antibiotics in commercial cattle, poultry and fisheries in Bangladesh.</p> <p>Identifying multidrug-resistant organisms in community and hospital settings.</p> <p>Identifying the prevailing strains of drug-resistant TB.</p> <p>Determining the rate and risk factors of transmission of MDR-TB and extensively drug-resistant TB (XDR-TB).</p> |
| <p>Determining the burden of vector borne diseases and their control and prevention.</p> | <p>Determining the burden and risk factors of dengue, and evaluating dengue vaccination.</p> <p>Exploring treatment for post kala-azar dermal leishmaniasis (PKDL).</p> <p>Determining the burden of asymptomatic malaria.</p> <p>Conducting surveillance for insecticide resistance in malaria vector mosquitoes.</p> <p>Determining burden and risk factors of chikungunya, and identifying prevention strategies.</p> |
| <p>Developing and implementing sustainable infection control measures in healthcare facilities.</p> | <p>Developing and conducting basic infection control training for medical students.</p> <p>Piloting and assessing low-resource package of infection control interventions for routine use in healthcare facilities.</p> <p>Implementing and assessing TB infection control among healthcare workers.</p> |
| <p>Develop evidence-based prevention packages for vulnerable populations at risk of acquiring blood-borne and sexually transmitted pathogens.</p> | <p>Assessing the burden, mode of transmission and circulating genotypes of HIV and hepatitis C virus (HCV) among people who inject drugs (PWID) nationally.</p> <p>Assessing the burden, mode of transmission and circulating genotypes of human papilloma virus (HPV), gonorrhoea, and syphilis among men who have sex with men (MSM) and sex workers nationally.</p> <p>Networking mapping of social and genotypic clusters to determine transmission dynamics and to model pathways to infection.</p> |

ACHIEVING UNIVERSAL HEALTH COVERAGE

We will support Bangladesh achieve universal health coverage, through health system research, policy research and advocacy designed to increase accessibility, improve quality and lower financial barriers to healthcare services.

THE GLOBAL CONTEXT

The demographic and epidemiological transition around the globe has resulted in an ageing population and greater prevalence of chronic diseases that require better access to quality healthcare services. 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 ensures 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 World Health Organisation: 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 multi-sectoral coordination for effective planning and service delivery. We have also contributed to the planning of the national social health insurance scheme, the costing of an essential health service delivery package, and development of a monitoring framework for universal health coverage.

Our field site in Chakaria in south-east 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 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. We will also continue undertaking research on monitoring and supervision of systems for improved governance and accountability.

Our research will focus specifically on increasing service availability, improving accessibility to quality care (e.g. 'ENRICH' nutrition service delivery programme), reducing out-of-pocket expenditure for healthcare, improving the health and social well-being of the elderly, and minimising the impact of social determinants of health. We will continue to engage policymakers and implementers at the national and grassroots level by encouraging them to use evidence-based strategies to address health system issues. We will also develop stronger links with the global universal health coverage community (e.g. by organising the 2nd International Symposium on Community Health Workers).

RESEARCH GOALS

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 with the goals of:

- Assessing challenges to the national health system in service availability and utilisation, resource availability, healthcare financing, policy and governance, for achieving universal health coverage (UHC).
- Testing innovative approaches to increase access to care, improve quality of services and reduce financial burden to ensure UHC.
- Monitoring progress on the national roadmap to UHC.
- Strengthening the existing learning platform for UHC.
- Strengthening the position of icddr,b in the global UHC network.

Achieving universal health coverage

| Research Goals | Targets by 2022 |
|--|---|
| <p>Assessing challenges to the national health system in service availability and utilisation, resource availability, healthcare financing, policy and governance, for achieving UHC.</p> | <p>Assessing national preparedness for implementation of an Essential Service Package (ESP), documenting gaps in coordination among relevant stakeholders and providing necessary guidelines for successful implementation of ESP in achieving UHC.</p> <p>Analysing adequacy of and compliance with current policies on the role of the private health sector as part of its commitment to serve the poor.</p> <p>Determining challenges and opportunities in implementing the national midwifery programme.</p> <p>Determining the factors contributing to the comparatively low use of public health service delivery systems as compared to the private sector for maternal health care services.</p> <p>Assessing the health status of the elderly population, their care-seeking patterns and the responsiveness of the health system to address their health care needs.</p> <p>Assessing the compliance of product labels and promotions related to breast milk substitute products available at commercial retail outlets to existing laws.</p> <p>Assessing the gaps in nutrition service delivery through health systems to develop a novel behaviour change communication strategy for a large-scale programme (ENRICH).</p> |
| <p>Testing innovative approaches to increase access to care, improve quality of services and reduce financial burden to ensure UHC.</p> | <p>Testing feasibility, acceptability and sustainability of community score card to improve quality of services and accountability in urban and rural health systems through community participation.</p> <p>Developing and testing the adoption of an ICT-based atlas mapping urban health facilities by the government and programme personnel for UHC promotion.</p> <p>Developing and testing a pilot general practitioner model for health care services for promotion of UHC in urban and rural areas.</p> <p>Conducting operations research for introduction of evening outdoor health services in public facilities to strengthen urban health service delivery.</p> <p>Assessing effectiveness of the leadership capacity development of programme managers in evidence-informed policymaking and/or enhanced governance/accountability.</p> <p>Undertaking operations research for adaptation of learning from the Chakaria micro health insurance model in the public sector.</p> <p>Evaluating the impact of the national health protection scheme in reduction of out-of-pocket expenditure, improving access to quality care, and protection against catastrophic healthcare expenses.</p> <p>Estimating cost of treatment and productivity losses for three vaccine-preventable diseases (pneumonia, diarrhoea and measles) in public and private sectors in Bangladesh.</p> <p>Conducting implementation research for improving the use of long-acting reversible contraceptives and permanent methods in rural Bangladesh.</p> <p>Testing the impact of supportive technology on use of expressed breast milk, infant feeding practices, maternal absenteeism and dropout among working women.</p> |

| Research Goals | Targets by 2022 |
|--|--|
| <p>Monitoring progress on the national roadmap to UHC.</p> | <p>Providing evidence to the Government of Bangladesh to substantiate the existing roadmap to UHC with development of a comprehensive monitoring framework to assess progress.</p> <p>Synthesising the available secondary data sources to monitor progress in UHC and health-related SDG indicators at a national level.</p> <p>Incorporating UHC and health-related SDG indicators in the rural and urban health and demographic surveillance systems of icddr,b and comparing them with national indicators.</p> |
| <p>Strengthening the existing learning platform for UHC.</p> | <p>Conducting policy dialogues on national health issues:</p> <ul style="list-style-type: none"> · Urban health · Epidemiological transition and non-communicable diseases (NCDs) · Factors affecting maternal mortality and antimicrobial resistance · Private sector and UHC · Human resources for health <p>Organising public engagement events for sensitising the community/stakeholders in the area of NCDs and emerging urban health issues.</p> <p>Capacity development training for health professionals and researchers on evidence-informed policymaking and research capacity development in relation to UHC.</p> <p>Conducting systematic reviews at the Systematic Review Centre (established at Bangabandhu Sheikh Mujib Medical University, BSMMU), on hypertension and other NCDs and urban health issues.</p> <p>Conducting gender equity and social inclusion workshops and implementing Athena Scientific Women's Academic Network at icddr,b and partner institutions.</p> |
| <p>Strengthening the position of icddr,b in the global UHC network.</p> | <p>Strengthening global networking for cross-country learning, sharing and capacity development on UHC.</p> <p>Undertaking research on regional and country comparisons to assess progress in implementation of UHC.</p> <p>Conducting case studies on successful and unsuccessful country experiences in planning, implementing and monitoring of UHC.</p> <p>Organising the '2nd International Symposium on Community Health Workers (CHW Symposium)' from 22-24 November 2019 supported by Health Systems Global.</p> |

ACHIEVING GENDER EQUALITY AND PROMOTING SEXUAL AND REPRODUCTIVE HEALTH AND RIGHTS

We will carry out research to address key gender-related health issues and to promote gender equality in sexual and reproductive health.

THE GLOBAL CONTEXT

In many societies, women do not enjoy equal access to health services, including sexual and reproductive health services. Furthermore, an estimated one in three women worldwide has experienced either physical and/or sexual violence in their lifetime. Most of this violence is by an intimate partner and 30% of women who have been in a relationship report an experience of physical and/or sexual violence by their intimate partner. This can have a significant impact on physical, mental, sexual and reproductive health.

THE SITUATION IN BANGLADESH

Violence against women is a major public health issue in Bangladesh. Surveys suggest that the overwhelming majority of women have experienced physical or emotional ill-treatment. Bangladesh

is also characterised by high levels of child marriage – at 59%, it is the fourth highest in the world. The country also has multiple sexual minorities and other vulnerable populations who face significant barriers in accessing sexual and reproductive health services.

OUR TRACK RECORD

We have a long history of work on gender inequalities and on sexual and reproductive health service provision for vulnerable communities. We have explored levels of and contributors to intimate partner violence in Bangladesh, and developed interventions that have significantly reduced levels of violence against young married women. We have established strong links with minority populations and the groups that work with them.

OUR APPROACH

Building on our existing strengths, prevention of gender-based violence, particularly intimate partner violence (e.g. 'HERrespect' study), will be a key focus over the next Strategic Plan period. We will also evaluate approaches for reducing child and forced marriage (e.g. 'Tipping Point' trial of child marriage prevention), and to reduce unintended pregnancies, particularly among married adolescents. The sexual and reproductive health and rights of women in vulnerable situations will be a further important focus of work. We will work with our colleagues across the organisation to ensure that gender parity is a consideration for all research.

RESEARCH GOALS

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 to promote gender equality in sexual and reproductive health. We will do this specifically by conducting research with the goals of:

- Reducing intimate partner violence against women and sexual minorities.
- Reducing child/forced marriages and unintended pregnancies.
- Promoting sexual and reproductive health and rights.
- Addressing gender issues in non-communicable diseases (NCD).

Achieving gender equality and promoting sexual and reproductive health and rights

| Research Goals | Targets by 2022 |
|---|--|
| <p>Reducing intimate partner violence against women and sexual minorities.</p> | <p>Evaluating HERrespect, an intervention aimed at reducing intimate partner and workplace violence against female garment workers in Bangladesh.</p> <p>Developing a scale to measure the legal environment in addressing child marriage, sexual harassment, domestic violence and marital rape:</p> <ul style="list-style-type: none"> • Rank countries by legal environment using the scale. • Perform a multi-country, multi-level analysis to assess whether laws in different countries protect adolescent girls from gender-based violence. <p>Developing a research protocol for exploring and addressing health, education and protection issues of adolescent Rohingya girls and boys in Cox’s Bazar.</p> <p>Developing a scale for measuring economic coercion against women.</p> <p>Analysing and preparing a national advocacy strategy on gender-based violence and legal barriers faced by sexual minorities.</p> |
| <p>Reducing child forced/marriage and unintended pregnancy.</p> | <p>Conducting randomised trials in Bangladesh and Nepal for evaluating ‘Tipping Point’, a CARE-implemented intervention to reduce child marriage.</p> <p>Evaluating an intervention to delay first/unintended pregnancies and to reduce unmet needs for first pregnancy among married adolescent girls in urban slums.</p> <p>Strengthening and evaluating existing intervention for increasing birth spacing among married adolescents.</p> <p>Designing, developing and testing innovative approaches for increasing birth spacing.</p> |

| Research Goals | Targets by 2022 |
|---|--|
| <p>Promoting sexual and reproductive health and rights (SRHR).</p> | <p>Determining risk context and vulnerabilities to SRHR of key populations and their partners and measuring gender disparity and implementation barriers in the prevention and treatment of sexually transmitted infections (STIs), HIV/AIDS and hepatitis C virus.</p> <p>Applying a model to prepare a national document to predict the trend of HIV and AIDS and for making gender-sensitive evidence-based policy decisions.</p> <p>Identifying gender gaps in ICT-based SRHR services for key populations at risk of STIs, HIV/AIDS and hepatitis C virus and establishing at least one web-based SRHR intervention platform.</p> <p>Conducting a study to identify gender and human rights related implementation barriers to improve quality of HIV and STI prevention services among key populations, particularly people who inject drugs.</p> <p>Conducting a study to assess community-led TB screening for addressing TB-HIV co-infections through a gender-sensitive approach for key populations at risk of HIV to improve sexual and overall health.</p> <p>Designing and implementing interventions on SRHR services for female partners of sexual minorities in Dhaka city.</p> |
| <p>Addressing gender issues in NCDs.</p> | <p>Identifying gender dimensions in NCDs among urban middle class, slum and rural cohorts, as well as recommendations for solutions.</p> |

RESEARCH INITIATIVES:

EXAMINING THE HEALTH CONSEQUENCES OF AND ADAPTATION TO CLIMATE CHANGE

We will evaluate the impact of climate change and migration patterns on population health in Bangladesh and ways in which populations can adapt.

THE SITUATION IN BANGLADESH

Average global temperatures are projected to rise by several degrees during this century, accompanied by more intense rainfall and rising sea levels. Bangladesh is highly vulnerable to climate change. It is likely to experience floods during the wet season, potentially balanced by droughts in the dry season as neighboring countries limit cross-border fresh water supply. It is also likely to face more extreme weather events.

There are concerns that climate change could affect the distribution and burden of vector-borne diseases such as malaria, dengue fever, kala-azar and Japanese encephalitis virus infections. Cholera outbreaks may also become more frequent as sea surface and river temperatures rise.

Health may also be affected in other ways. Heat stress is already occurring in urban areas, while rising salinity levels in coastal districts are likely

to reduce crop production and exacerbate conditions such as hypertension. Large-scale population displacements are highly likely.

OUR TRACK RECORD

We have a history of research on the links between climate and spread of infectious diseases, and in recent years we have been building our expertise in environmental science. Our interdisciplinary projects examine human-environment interactions in vulnerable coastal areas, including its impact on health and well-being.

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 Adaption 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.

RESEARCH GOALS

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 do this specifically by conducting research with the goals of:

- Evaluating the effects of climate change on population health.
- Assessing the effects of climate change on population migration patterns.
- Developing adaptation strategies for vulnerable populations in Bangladesh.
- Synthesising ongoing work on the impact of climate change on population health in Bangladesh.

Examining the health consequences of and adaptation to climate change

| Research Goals | Targets by 2022 |
|---|---|
| Evaluating the effects of climate change on population health. | <p>Analysing meteorological and national and sub-national mortality and morbidity data to assess the effects of temperature-related extreme weather events (such as heat stress) on mortality and morbidity patterns.</p> <p>Understanding the relationship between air quality and pregnancy outcomes by analysing existing data from relevant sources.</p> <p>Analysing existing data to examine the effects of climate change (temperature, rainfall, humidity) on the transmission of vector-borne diseases namely malaria and dengue.</p> <p>Conducting studies to identify the effects of drinking water salinity on maternal and child health in coastal districts.</p> <p>Estimating economic cost of climate-sensitive diseases and evaluating adaptive strategies for a resilient future.</p> |
| Assessing the effects of climate changes on population migration patterns. | <p>Assessing the processes, dynamics and aftermath of migration in relation to extreme weather events, sea level rise and river-bank erosion.</p> |
| Developing adaptation strategies to climate change for vulnerable populations in Bangladesh. | <p>Participating in the national adaptation planning process and contributing to the development of the National Health Adaptation Plan to climate change.</p> <p>Identifying and testing adaptation strategies to mitigate the health effects of drinking water salinity on maternal health.</p> <p>Identifying and testing adaptation strategies to mitigate the effects of extreme heat in urban areas.</p> |
| Synthesising ongoing work on the impact of climate change on population health in Bangladesh. | <p>Establishing an in-house data centre on climate change and health by collecting and storing relevant national and global climate and health data sets.</p> <p>Analysing relevant global and national climate and health data and publishing annual updates on the status of climate forces, consequences, and impacts on health in Bangladesh.</p> |

PREVENTING AND TREATING NON-COMMUNICABLE DISEASES

We will respond to the burden of chronic diseases in Bangladesh, document current care practices and health-seeking behaviours, and evaluate new interventions relevant to low-income countries, with a focus on cardiovascular disease, diabetes and mental health disorders. Our work will contribute to scalable solutions that are cost-effective in reducing the non-communicable diseases (NCD) burden in Bangladesh, and are potentially applicable elsewhere in the global South.

THE GLOBAL CONTEXT

NCDs are major killers worldwide, causing 39.5 million deaths every year, including 31 million in low- and middle-income countries. NCDs also pose a huge threat to development and economic growth. The burden of NCDs is on the rise due to population ageing, an improved economy, rapid urbanisation and an increase in unhealthy and sedentary life styles. This will cost health systems an estimated USD 30 trillion globally by 2030.

THE SITUATION IN BANGLADESH

The prevalence of NCDs has escalated at an alarming rate in Bangladesh over recent decades. All major risk factors for NCDs are widespread and 99% of the population has at least one NCD risk factor, including tobacco use, inadequate intake of fruits and vegetables, low physical activity, obesity or high blood pressure. In response to this growing threat, Bangladesh has developed a national strategy for Surveillance and Prevention of Non-communicable Diseases. A dedicated unit has been established within the Ministry of Health and Family Welfare, and new service delivery options are being piloted.

OUR TRACK RECORD

NCDs are a relatively new area of icddr,b work. We have witnessed the shift from communicable to non-communicable diseases using our Matlab surveillance data, and have secured competitive grants to conduct multidisciplinary research on major NCDs (cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes) and common mental health disorders in children, adolescents, women (e.g. pregnant and lactating women), men, and the elderly.

OUR APPROACH

Our future work will have a particular focus on cardiovascular disease, diabetes and mental health disorders. In addition to generating a deeper understanding of the disease burden and risk factors, we will develop and evaluate prevention and treatment strategies suitable for implementation in resource-poor settings (e.g. ‘m-Health’ and ‘COBRA-BPS’ studies for hypertension treatment, ‘BELIEVE’ rural vascular health study, and National Micronutrient Survey and NCD risk). We will partner with colleagues across icddr,b and other national institutions, and collaborate with overseas partners. We will develop pragmatic solutions to tackle this rapidly growing area of health concern.

RESEARCH GOALS

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:

- Characterising the burden and risk factors of hypertension, and evaluating strategies for control.
- Understanding current challenges of diagnosis and management of diabetes mellitus, and evaluating new strategies for improving glycaemic control in Bangladesh.
- Assessing the burden and risk factors of cardiovascular disease, and identifying strategies for prevention of premature deaths.
- Assessing the burden of common mental health disorders and evaluating strategies for improving mental healthcare in various settings.

Preventing and treating of non-communicable diseases

| Research Goals | Targets by 2022 |
|---|---|
| <p>Characterising the burden and risk factors of hypertension, and evaluating strategies for control.</p> | <p>Identifying the factors contributing to uncontrolled hypertension in rural populations and developing strategies for control.</p> <p>Developing strategies for improving treatment at primary care facilities for control of hypertension in rural Bangladesh.</p> <p>Identifying barriers for seeking treatment among patients with hypertension in rural areas and developing strategies for improving access to primary care.</p> <p>Assessing feasibility of integrating screening tools in the existing health surveillance systems for tracking the burden and risk factors of hypertension.</p> <p>Integrating m-Health in hypertension care for improving medication adherence in rural areas.</p> <p>Conducting randomised controlled trials to evaluate new interventions for control of hypertension in rural settings in Bangladesh.</p> <p>Enhancing capacity of the government health workforce for improved management of hypertension in sub-district hospitals in Bangladesh.</p> <p>Assessing the burden of chronic kidney disease among adults and developing strategies for control.</p> <p>Implementing community-based lifestyle modification interventions for prevention of hypertension in rural Bangladesh.</p> <p>Promoting healthy eating and active living strategies in the workplace for prevention and control of hypertension in urban areas.</p> |
| <p>Understanding current challenges of diagnosis and management of diabetes mellitus, and evaluating new strategies for improving glycaemic control in Bangladesh.</p> | <p>Developing strategies for enhancing capacity of health systems for early detection of gestational diabetes in urban areas.</p> <p>Integrating m-Health intervention in post-natal care for prevention of diabetes among women with prior gestational diabetes in an urban area.</p> <p>Conducting randomised controlled trials to evaluate prevention strategies for diabetes among women with prior gestational diabetes in urban areas.</p> <p>Identifying a strategy to detect diabetic retinopathy among patients with diabetes in outpatient setting and implementing behavioural change communications for glycaemic control.</p> <p>Assessing lifestyle behaviour among diabetic patients in the community, and identifying factors contributing to poor glycaemic control.</p> |

| Research Goals | Targets by 2022 |
|--|---|
| <p>Assessing the burden and risk factors of cardiovascular disease (CVD) and identifying strategies for prevention of premature deaths.</p> | <p>Assessing the burden of CVDs (stroke and myocardial infarction [MI]) in rural areas and identifying barriers in health systems for care.</p> <p>Assessing the risk factors of CVD in overweight/obese populations and developing strategies for control.</p> <p>Assessing cardiometabolic risk factors among populations with micronutrient deficiency in urban and rural areas.</p> <p>Assessing the feasibility of lifestyle intervention programmes at work sites for prevention of CVDs in urban areas.</p> <p>Understanding the risk of CVD among people exposed to environmental toxins, and identifying strategies to reduce the risk.</p> <p>Assessing the prevalence of respiratory infections among patients with CVDs, and developing strategies to prevent recurrent MI.</p> <p>Assessing the burden of NCD risk factors among school-age children, and correlation with malnutrition, and identifying strategies for prevention.</p> <p>Enhancing capacity of medical doctors for conducting clinical research for prevention and control of CVDs.</p> <p>Developing a rural cohort for monitoring burden and risk factors of NCDs.</p> |
| <p>Assessing the burden of common mental health disorders and identifying strategies for improving mental health in children, adolescents, pregnant women and adults.</p> | <p>Assessing the burden of depressive symptoms in adults and adolescents in the community and identifying barriers to mental healthcare.</p> <p>Assessing the role of depression among patients with uncontrolled hypertension and integrating mental health services in primary care for control of blood pressure.</p> <p>Identifying factors contributing to depression among pregnant women and integrating strategies at primary care facilities for control of perinatal depression.</p> <p>Assessing the burden of depression among mothers of children with common neurodevelopmental disorders and developing strategies for management.</p> <p>Identifying common mental health issues in children and adolescents, and implementing strategies for providing psychosocial counselling in the community.</p> |

DEVELOP AND PROMOTE USE OF INNOVATIONS FOR BANGLADESH AND THE GLOBAL SOUTH

We will develop, evaluate and promote the implementation of innovations – products, tools and innovative models of service delivery – tailored to the needs of Bangladesh and other low-resource settings.

Innovation is rooted in our history. Our most notable achievement is the development of oral rehydration solution (ORS), a simple sugar-salt-water mixture for tackling the life-threatening dehydration associated with acute diarrhoea. ORS is an innovation estimated to have saved over 50 million lives.

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.

However, through our international partnerships, we can identify technological advances, as well as progress in understanding disease and its treatment, and develop products and tools that have a realistic chance of being taken up and making a real difference to the lives of people in Bangladesh and elsewhere in the global South. We can also exploit advances in information technology to develop innovative tools and ways of working that improve healthcare planning and delivery.

Furthermore, we have the capabilities to develop, pilot and evaluate innovations in rigorous trials, generating key evidence on their performance, and to explore their implementation within health systems.

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.

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. We are now building international partnerships with countries such as Nepal and Myanmar, with a view to widening its uptake and preventing even more deaths from post-partum haemorrhage. Our bubble CPAP approach is also being evaluated in Ethiopia as we seek to disseminate the fruits of our labours across the global South.

SPECIFIC GOALS

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

- Implementing bubble CPAP in low-resource facilities in Bangladesh and another country overseas
- Scaling up a social enterprise model for improving TB care in private sector of urban areas in Bangladesh and other high TB burden countries
- Scaling up the use of the birthing mat (Q-Mat) system, 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

Translate our innovations into policy and practice in Bangladesh and globally

| Specific Goals | Targets by 2022 |
|--|---|
| Implementing bubble-CPAP in frontline clinical facilities in Bangladesh and at least one additional lower or middle income country (LMIC) | <p>Communicating and influencing uptake of bubble CPAP in Bangladesh and Ethiopia.</p> <p>Implementing bubble CPAP in select public hospitals in Bangladesh and Ethiopia.</p> <p>Creating a bubble CPAP video demonstrating the technique for global use.</p> <p>Identifying adjustments needed to use bubble CPAP in receiving countries' health care infrastructure.</p> |
| Scaling up the Social Enterprise Model (SEM), entailing public-private sector collaboration, for improving detection and treatment of tuberculosis in urban areas in Bangladesh and at least one additional high tuberculosis country | <p>Establishing Social Enterprise Model (SEM)-based tuberculosis detection centers for improving tuberculosis detection and care in the private medical sector of urban areas in 15 districts of Bangladesh.</p> <p>Identifying and assisting establishment of Social Enterprise Model (SEM)-based TB screening and treatment centers for improving tuberculosis care in urban areas of at least one additional high tuberculosis LMIC.</p> |
| Scaling up the use of the Birthing (Q) Mat system – through its use in existing referral systems in Bangladesh and globally. | <p>Working with the Government of Bangladesh to adopt specific strategies, involving the Birthing (Q) Mat, to improve programmes for referring and managing PPH.</p> <p>Completing the demonstration project and implementation research on strategies for improving the management of PPH, including the Birthing (Q) Mat as a critical component, in Myanmar.</p> |
| Introducing microbiota-directed complementary food (MDCF) to combat childhood undernutrition | <p>Completing a clinical trial of MDCF to prevent childhood malnutrition in Bangladesh.</p> <p>Assuring that, if successful, MDCF will be patented to ensure availability of this product at affordable prices in LMICs.</p> |
| Introducing high zinc rice in Bangladesh to control zinc deficiency | <p>Conducting the final bioavailability trial to estimate the amount of zinc absorbed from high zinc rice (BRRI Dhan 42) in young children in Bangladesh, followed by an effectiveness trial.</p> <p>Assuring that, if successful, high zinc rice will be patented to ensure availability of this product at affordable prices in LMICs.</p> |

PROVIDE **CLINICAL SERVICES AND SUPPORT HUMANITARIAN RESPONSES**

Through our hospitals, we will continue to provide high-quality clinical services in diarrhoeal diseases and malnutrition. We will also provide advice and training in humanitarian emergency response situations.

For decades, as part of our ‘social contract’ with the communities with whom we work, we have provided an enduring humanitarian response of high-quality clinical care through our hospitals in Dhaka and Matlab and at the Mirpur Treatment Centre. This care, primarily focused on diarrhoeal diseases and malnutrition, is provided free of cost to those in need. The hospital facilities are also an important base for clinical research and surveillance, as well as for the training of healthcare professionals.

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. Most recently, ultra-low-cost ‘bubble CPAP’ equipment developed at icddr,b has paved the way to providing access to otherwise unaffordable ventilation for millions of children fighting pneumonia. 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.

As a founding member of the WHO Global Outbreak Alert and Response Network, we will continue to respond to requests for technical assistance in managing outbreaks of diarrhoeal disease worldwide. We will explore ways to limit the risk of disease

outbreaks in crisis situations and contribute to international disaster responses.

Within Bangladesh, large numbers of forcibly displaced populations represent a significant humanitarian challenge. We will continue to work with the Government of Bangladesh and other partners on disease prevention and healthcare provision among these vulnerable communities.

SPECIFIC GOALS

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

- Continuing to provide quality clinical services primarily for diarrhoeal diseases and malnutrition.
- Conducting clinical research in the hospitals.
- Conducting diarrhoeal disease surveillance.
- Training healthcare professionals on management of diarrhoea and malnutrition.
- Identifying proactive measures to curtail cholera outbreaks in emergency responses.
- Participating in missions both in Bangladesh and overseas to control outbreaks of diarrhoea and malnutrition in disaster situations.

Provide clinical services and support humanitarian responses

| Specific Goals | Targets by 2022 |
|---|---|
| <p>Providing quality clinical services primarily for diarrhoeal diseases and malnutrition.</p> | <p>Continuing to provide clinical care to patients suffering from diarrhoea, malnutrition, pneumonia and complications.</p> <p>Improving or maintaining quality of clinical care.</p> <p>Conducting clinical research.</p> <p>Providing clinical care to populations affected by humanitarian crisis.</p> <p>Training health professionals on clinical care in emergency situations, controlling epidemics of diarrhoea etc.</p> <p>Continuing to support vaccination campaigns (oral cholera vaccine, rotavirus etc.) and related disease surveillance in humanitarian crises.</p> |

INVEST IN **OUR RESEARCH PLATFORMS AND FIELD SITES**

We will continue to develop our research infrastructure – for population-based, clinical and laboratory-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 south east 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. icddr,b is keen to implement a focused research strategy for Matlab leveraging its capabilities as an attractive site for studies of infectious and non-communicable diseases.

SPECIFIC GOALS

Laboratories:

- Ensuring proficiency and scalability of laboratory tests and services.
- Enforcing continuous compliance and assurance towards quality and safety of laboratory operations.
- Undertaking research, development and outreach in the areas of environmental health, genomics and bioinformatics.
- Continuing to invest in laboratory sciences suitable for multi-sectoral ('One Health') applications.

Invest in our research platforms

| Specific Goals | Targets by 2022 |
|---|--|
| <p>Ensuring proficiency and scalability of laboratory tests and services.</p> | <p>Achieving maximum proficiency in laboratory tests and procedures to meet global standards.</p> <p>Assessing capacity and identifying any under-capacity or over-capacity issues for all labs.</p> <p>Scaling up genomics, proteomics and metagenomics platforms and services for field level applications.</p> |
| <p>Enforcing continuous compliance and assurance towards quality and safety of laboratory operations.</p> | <p>Continuing to audit and accredit technologies and skills available in labs.</p> <p>Continuing to maintain strong laboratory operations and management procedures to ensure that biosafety and quality assurance procedures as well as equipment conform to best international practices.</p> |
| <p>Undertaking research, development and outreach in the areas of environmental health, genomics and bioinformatics.</p> | <p>Developing laboratory sciences in the areas of integrated surveillance and epidemiology of infectious and non-communicable diseases using machine learning and artificial intelligence approaches.</p> <p>Developing laboratory diagnostics and surveillance systems for environmental health and human-animal biomonitoring.</p> <p>Continuing to develop training and dissemination programmes in the areas of laboratory medicine, epidemiology and genomics, especially tailored to the requirements of the global South, and developing partnerships with institutions in high-income countries.</p> |
| <p>Continuing to invest in laboratory sciences adapted to multisectoral applications.</p> | <p>Devising a costed, future-proof investment strategy to ensure laboratories' research keeps pace with modern molecular sciences.</p> <p>Investing in laboratory sciences and services platforms adapted for One Health and global antimicrobial resistance surveillance.</p> |

Field sites:

- Ensuring relevance of core field sites in supporting cutting-edge research studies in priority research areas.
- Maximising cost-efficiency and optimum use of core field sites.
- Ensuring visibility of core field sites at the national and global level.

Invest in our field sites

| Specific Goals | Targets by 2022 |
|--|--|
| Ensuring relevance of core field sites in supporting cutting-edge research studies in priority research areas. | <p>Developing and implementing the Matlab strategic plan.</p> <p>Reviewing field site capacity to match national and global research priorities and identifying research priorities.</p> <p>Determining the future of different programme units under field sites which are not fully utilised by research priorities and initiatives.</p> <p>Developing a strategic plan for Chakaria field site by 2019 and starting implementation.</p> |
| Maximising cost efficiency and optimum use of core field sites. | <p>Reviewing operational cost for field sites.</p> <p>Identifying and implementing cost containment and cost recovery strategies in the field sites.</p> <p>Increasing research contribution by at least 10% per year at field sites.</p> |
| Ensuring visibility of core field sites at the national and global level. | <p>Highlighting the special features of field sites to attract new research through the icddr,b website.</p> <p>Identifying opportunities to use field sites as demonstration sites for training offered by icddr,b and other national and international organisations.</p> <p>Developing course contents using research experiences and research findings generated from the field sites in the training offered by icddr,b.</p> <p>Ensuring use of field sites as demonstration sites in at least 10% of training sessions conducted by icddr,b.</p> |



INCREASE THE **VISIBILITY AND IMPACT OF OUR RESEARCH EVIDENCE**

We will build skills and partnerships to ensure that our research evidence has impact on national and international policies, programmes and practices.

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.

Our external training unit is well established and offers a range of popular and well-regarded courses. To ensure that we

continue to offer relevant expertise and as part of our commitment to continual quality improvement, we will thoroughly review all areas of this unit. This will ensure that we can remain confident in the services and information we disseminate.

Our knowledge and experience of conducting courses for health professionals from Bangladesh, the region and further afield is highly sought after. We will continue to contribute to knowledge transfer and human capacity development through our close ties with the BRAC James P Grant School of Public Health.

We will build skills and partnerships to ensure that our research evidence has impact on national and international policies, programmes and practices.

SPECIFIC GOALS

- Disseminating research findings through a range of scientific channels (publications, presentations, online).
- Disseminating research findings through a range of mainstream communication channels to create impact and share knowledge.
- Increasing active engagement with policymakers, practitioners and advocacy groups.
- Increasing impact and knowledge sharing through advocacy and dissemination events.
- Reviewing current training across icddr,b and completing internal training needs assessment.

Increasing the visibility and impact of our research evidence

| Specific Goals | Targets by 2022 |
|--|---|
| Disseminating research findings through a range of scientific channels (publications, presentations, online). | <p>Reducing time to publication: first publication of results in an international peer-reviewed journal within 12 months of completion of the protocol.</p> <p>Increasing level of publishing in high-impact journals.</p> <p>Increasing awareness: every completed study must arrange a seminar, monitored by Research Administration.</p> <p>Creating policy/research brief for every project for communicating research.</p> |
| Disseminating research findings through a range of mainstream communication channels to create impact and share knowledge. | <p>Maintaining or increasing level of current media coverage year on year, including print and online media.</p> <p>Increasing quality of research reporting through targeting influential media.</p> <p>Identifying one theme per year for intensive coverage.</p> <p>Facilitating younger scientists to present their work through the media.</p> <p>Maintaining or increasing a cumulative average of digital and social media reach and engagement of previous two years.</p> <p>Increasing visibility of icddr,b's global humanitarian work in the hospitals and emergency relief.</p> <p>Producing media coverage on icddr,b's South to South work in Ethiopia, Nepal and Myanmar and other locations as they emerge.</p> |
| Increasing active engagement with policymakers, practitioners and advocacy groups. | <p>Increasing representation on national, regional and global committees.</p> <p>Increasing number of advocacy partners to listen and respond to community concerns and to expand influence.</p> |
| Increasing impact and knowledge sharing through advocacy and dissemination events. | <p>Disseminating the new strategic plan to core donors and key stake holders.</p> <p>Disseminating end of project information to key stake holders and decision makers.</p> <p>Forming new networks and better utilising existing networks to inform and influence uptake of innovations and research recommendations.</p> |
| Reviewing current training across icddr,b and completing internal training needs assessment. | <p>Completing a comprehensive review of training by end of 2019, with a strategic training plan written by 2020.</p> |

INVEST IN **OUR PEOPLE**

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.

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 building the capacity and competency of all employees 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 employer.

SPECIFIC GOALS

- Recruiting a mix of high-potential, professional and motivated staff who will work collaboratively across the organisation and with external partners.
- Developing thought leadership and proactive people management.
- Building a strong and supportive organisation.
- Strengthening gender diversity and equality in all people-related activities.

Invest in our people

| Specific Goals | Targets by 2022 |
|--|---|
| <p>Recruiting a mix of high-potential, professional and motivated staff who will work collaboratively across the organisation and with external partners.</p> | <p>Developing and updating icddr,b skills mix by identifying workforce requirements for locally and internationally recruited staff.</p> <p>Developing workforce planning capabilities and talents analytics enabling proactive forecasting and evidence-based response to talent needs.</p> <p>Focusing investment in learning and development on critical skills needed by icddr,b.</p> |
| <p>Developing thought leadership and proactive people management.</p> | <p>Strengthening leadership and management capabilities.</p> <p>Equipping all principal investigators with information and skills for effective decision making.</p> <p>Reviewing all HR processes to ensure that policies, procedures and rules are well defined and communicated.</p> <p>Implementing HR processes to optimise transparency.</p> |
| <p>Building a strong and vibrant organisation.</p> | <p>Simplifying the Performance Management and Development System process by developing performance criteria and indicators corresponding to each level.</p> <p>Establishing measures to reward values-led behaviour (excellence, integrity, inclusivity).</p> <p>Implementing a time management system.</p> <p>Assessing, developing and implementing approaches to support appropriate organisational structure, including definition of roles, workloads, required skills mix, use of appropriate contractual modalities, succession planning by department in place to secure future capacity and resources by June 2020.</p> <p>Creating opportunities for formal and informal communication within and across departments and among staff.</p> <p>Developing, implementing and reinforcing code of conduct to include e-learning awareness training for all staff.</p> <p>Continuously measuring attendance at sessions to ensure compliance. Sessions will include:</p> <ul style="list-style-type: none"> • Harassment • Whistle blowing • Conflict of interest • Sexual exploitation and abuse <p>Creating an online staff declaration of interests form.</p> |
| <p>Strengthening gender diversity and equality in all people related activities.</p> | <p>Assessing and updating HR policies and processes to ensure that they are gender sensitive/friendly and in line with international best practices.</p> <p>Developing and implementing means for branding icddr,b as a gender- and diversity-focused employer.</p> <p>Developing an action plan focused on leveraging, diversity, equality and inclusion-target groups to be sourced for specific positions.</p> |

IMPROVE ORGANISATIONAL EFFICIENCY AND COST-EFFECTIVENESS

We will continue to update and improve our business processes and governance regularly and modernise our operations to maximise efficiency and cost-effectiveness.

Considerable improvements have been made to our system of governance and all areas of central management services under the 2015-2018 Strategic Plan. 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 improved 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 will continue this on-going modernisation programme, introducing a new enterprise resource planning system to support streamlined business processes and more efficient reporting, utilising business intelligence, and delivering effective budgetary management. We will develop a comprehensive risk register and continue to strengthen internal mechanisms of financial oversight and accountability.

SPECIFIC GOALS

- Continuously updating and improving our business processes and governance.
- Ensuring effective budgetary management, allocation and accurate costing.
- Updating and developing targeted and performance-based indicators to facilitate the timely delivery of the strategic plan.
- Ensuring the adequacy and effectiveness of risk management, control and governance.

Improve organisational efficiency and cost-effectiveness

| Specific Goals | Targets by 2022 |
|---|---|
| Continuously updating and improving our business processes and governance. | <p>Implementing enterprise resource planning (ERP) system providing automated and efficient management and monthly reporting for HR, Finance, Supply Chain Management and Procurement, and Research Administration.</p> <p>Identifying business processes such as payment times, invoice collection times and Procurement to Payment (P2P) times in other research institutions and produce comparative analysis by end of 2020.</p> <p>Reviewing, evaluating and benchmarking the functionality of current safety and security processes to ensure that they are adequate for the safety and security of icddr,b's staff, assets and operations in normal and adverse situations.</p> <p>Developing interfaces set up with Laboratory Information Management System (LIMS), Time Management and other databases automated leading to reduction in manual inputs.</p> <p>Revisiting and developing revised key service level agreements across Central Management Services.</p> <p>Implementing an automatic system to measure process times using the ERP.</p> <p>Ensuring IT/ERP/email and other systems are secure and protected against viruses, crashes and unauthorised access.</p> <p>Training Board of Trustees members every two years to assist them to carry out their mandate.</p> <p>Developing an appropriate intellectual property policy and strategy for icddr,b balancing identification and utilisation of valuable intellectual property with scientific governance, research administration systems and ethical oversight.</p> |
| Ensuring effective budgetary management, allocation and accurate costing. | Provisioning of efficient and effective budgetary management according to best practices. |
| Updating and developing targeted and performance based indicators that will facilitate the timely delivery of the Strategic Plan. | Provisioning of departmental annual work plans including key performance indicators (KPIs) to ensure monitoring and success. |
| Ensuring the adequacy and effectiveness of risk management, control and governance | <p>Maintaining and updating risk register.</p> <p>Completing risk assessment thereby contributing to the improvement of risk management processes as per the Institute of Internal Auditors (IIA) Standard 2120.</p> <p>Preparing annual work plan for internal audit as per IIA Standard 2010 and submit it to the November Board meeting of the previous year for approval of Finance and Audit Committee (IIA Standard 2020 and 1110).</p> <p>Ensuring completion of all planned audits and issuing of audit reports to the clients within one month of completion of field work.</p> <p>Addressing and implementing audit recommendations in a timely manner and performing quarterly review of implementation of audit recommendations.</p> <p>Providing consultation engagement as requested by the management to improve the operation of the organisation as per IIA Standard 2010.C1.</p> <p>Presenting annual report to the Finance and Audit Committee in June Session (IIA) Standard 1110.</p> |

ENSURE **FINANCIAL SUSTAINABILITY**

As well as carefully controlling expenditure, we will strengthen our fundraising strategy and maximise opportunities for income generation.

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 of work.

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, 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 will be developed by June 2019 for programme, corporate, government and philanthropic areas with a goal of securing USD 10m in new funding annually by 2021.

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

A formal analysis will examine the potential for establishing a substantial endowment funding programme.

SPECIFIC GOALS

- Ensuring full cost recovery.
- Ensuring optimum use of available resources.
- Securing appropriate resources for research.
- Increasing levels of revenue generation from new and current sources.
- Enhancing fundraising function and its effectiveness.

Ensure financial sustainability

| Specific Goals | Targets by 2022 |
|---|--|
| Ensuring full cost recovery. | <p>Ensuring total operating costs attributed to administrative and management are less than 15%.</p> <p>Ensuring our annual total cost recovery for all projects (within approved donor limits) fully funds our central management costs each year.</p> <p>Reducing staff costs through executing the automated time management software.</p> |
| Ensuring optimum use of available resources. | <p>Ensuring that actual expenditure is controlled and does not exceed agreed (flexed) budgets by 5%.</p> <p>Ensuring that the number of no-cost (project) extensions are reduced.</p> <p>Reducing the number of no project cost extensions.</p> <p>Executing value based contracts by management.</p> <p>Ensuring all contracts proposed over 100k must provide cost benefit analysis information.</p> |
| Securing appropriate resources for research. | <p>Maintaining diversity of research funding to provide wider portfolio in research priority areas.</p> <p>Ensuring at least 60% of all grants received are under the category of Prime recipient and not as a sub recipient.</p> <p>Ensuring not more than 10% of grants received in a year are less than a grant value of USD 10,000.</p> |
| Increasing levels of revenue generation from new and current sources. | <p>Ensuring income generated from non-research sources increases annually.</p> |
| Enhancing fundraising function and its effectiveness. | <p>Developing comprehensive fundraising strategy including programme, corporate, government and philanthropic funding by June 2019 with goal of securing USD 10 million in new funding annually by end 2021.</p> <p>Focusing the plan on supporting icddr,b's humanitarian mission, driving South-South collaboration and funding priority Goal 7.</p> |

MONITORING **AND EVALUATION**

We will develop a detailed implementation plan for the Strategic Plan, as well as updating our key performance indicators to monitor progress and report to our core donors and Board of Trustees. A review will be undertaken to assess the achievement of objectives and to inform the development of a subsequent Strategic Plan.

Rigorous internal oversight, including regular internal audit reviews, will promote strong financial control and ensure value for money. A new enterprise resource planning system will provide more efficient ways of tracking and reporting financial expenditure and facilitate budget setting.

The Senior Leadership Team will provide day-to-day oversight and be accountable to the Board of Trustees.

We will continue to employ independent auditors for our annual accounts and financial statements. As in previous years, we aim to receive unqualified (healthy) audit opinions and be categorised as a 'low-risk auditee' in line with US Government auditing standards.



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