NOAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

Noakhali - 3814, Bangladesh.

SDG PROGRESS REPORT 2024

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Comprehensive Report: SDG 3 - Good Health and Well-being

Noakhali Science and Technology University

December 2024

Introduction

Noakhali Science and Technology University (NSTU) is profoundly dedicated to advancing Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages. In 2024 alone, our researchers produced a remarkable portfolio of 136 high-impact publications directly supporting this goal.

Our extensive body of work demonstrates a comprehensive strategy, built on two key pillars:

1. **Research and Innovation:** A high-impact 2024 research portfolio (136 publications) tackling the world's most pressing health challenges, from environmental hazards to AI-driven diagnostics.
2. **Operations and Community Engagement:** Institutional policies and direct-action programs that promote health on campus and serve our local community.

This report details our 2024 accomplishments across these critical pillars.

Pillar 1: A 360-Degree Research Strategy

Pillar 1: Progress through Research and Innovation

Our research is organized around four core pillars, demonstrating a 360-degree approach to global health.

Section 1.1: Addressing Environmental Health Hazards (Target 3.9)

A significant portion of our 2024 research focused on Target 3.9, reducing illnesses from hazardous pollution.

- **Microplastics and Chemical Pollution:** We produced an extensive body of work identifying and assessing the risk of microplastics and heavy metals in water, food, and ecosystems (Riya, K.K. et al.; Parvez, M.S. et al.; Banik, P. et al.; Md Saad, S.A. et al.; Paray, B.A. et al.; Siddique, M.A.M. et al.; Mubin, A.N. et al.).
- **Heavy Metal Contamination:** We conducted critical risk assessments of heavy metal contamination from shipbreaking, groundwater, and food sources like vegetables, rice, meat, and fish feed (Lipi, J.A. et al.; Tajwar, M. et al.; Chowdhury, A.I. et al.; Shaheen, N. et al.; Rakib, M.R.J. et al.; Siddique, M.A.M. et al.).
- **Air and Water Quality:** Our research also tackled air pollution, with studies on PM2.5 (Sangkham, S. et al.; Hasan, K. et al.; Rahman, M. et al.) and pesticide residues in surface water (Bhuiya, A. et al.).
- **WASH (Water, Sanitation, Hygiene):** We provided direct solutions for safe drinking water, including assessments of pond sand filters (Khan, M.S. et al.) and the development of "safe water atlases" (Jakariya, M. et al.).

Section 1.2: Tackling the Burden of Disease (Targets 3.3, 3.4)

Our researchers are at the forefront of the fight against the world's biggest killers, from chronic diseases to infectious outbreaks and mental health disorders.

- **Non-Communicable Diseases (NCDs):** We have a massive research focus on Target 3.4. This includes genetic, diagnostic, and preventative studies on cancer (Momin, M.B. et al.; Aziz, M.A. et al.; Mahmud, M.T. et al.; Reza, S. et al.), cardiovascular disease & diabetes (Shuvo, T.A. et al.; Mitu, F.S. et al.; Alam, M.M. et al.; Biswas, R.K. et al.).
- **Mental Health:** We are addressing this critical area with studies on depression among trauma survivors (Siddik, M.A.B. et al.) and the mental health of adolescents (Hossain, S.M.R. et al.).
- **Communicable Diseases (CDs):** Our research on Target 3.3 includes modeling the impact of climate on dengue transmission (Miah, M.M. et al.; Islam, M.T. et al.), analyzing vaccination strategies for Ebola (Islam, M.R. et al.), and pioneering modern surveillance tools like wastewater-based monitoring for Mpox and SARS-CoV-2 (Islam, M.A. et al.).

Section 1.3: Innovating in Diagnostics, Therapeutics, and R&D (Targets 3.b, 3.d)

A cornerstone of our SDG 3 strategy is developing the next generation of health technologies and treatments.

- **AI & Machine Learning in Health:** We have an exceptionally strong portfolio in applying AI for health diagnostics. This includes novel deep learning and ML models for NCDs like myocardial infarction, chronic kidney disease, and various cancers (Sayed, M.S. et al.; Halder, R.K. et al.; Hossain, S.M.R. et al.; Mohi Uddin, K.M. et al.; Biswas, S. et al.; Imam, M.H. et al.; Roy, T. et al.).
- **In-Silico Vaccine & Drug Design:** Our computational biologists are designing next-generation vaccines and identifying therapeutic compounds for a range of diseases, including Borna Disease Virus, Nipah virus, Marburg virus, and multiple serotypes of Dengue virus

(Siddiquee, N.H. et al.; Masum, M.H.U. et al.; Saha, O. et al.; Parvin, R. et al.; Halder, S.K. et al.).

- **Pharmacology & Therapeutics:** Our research also includes developing new therapeutics, from bioengineered heparin (Sultana, R. et al.) and nanotechnology in cancer treatment (Hassan Chowdhury, M.M. et al.) to advanced drug-delivery systems and identifying potent natural compounds (Barman, A.K. et al.; Amanat, M. et al.; Ahmed, S. et al.).

Section 1.4: Strengthening Health Systems & Targeted Interventions

Finally, our research provides the specific, evidence-based guidance needed to strengthen health systems.

- **Sexual & Reproductive Health (Target 3.7):** We produced foundational meta-analyses on contraceptive use (Hossain, S.M.R. et al.) and identified environmental threats to pregnancy like salinity (Hossain, S.M.R. et al.).
- **Maternal Health (Target 3.1):** Our research identified key factors for the utilization of antenatal care services (Shill, L.C. et al.), a crucial intervention for reducing maternal mortality.
- **Antimicrobial Resistance (AMR) (Target 3.d):** We are tackling the "One Health" challenge of AMR by identifying multidrug-resistant pathogens in poultry, the food chain, and clinical settings (Munim, M.A. et al.; Haque, M.A. et al.; Tawhid, M. et al.; Adeiza, S.S. et al.).
- **Road Safety (Target 3.6):** We directly addressed this target by analyzing the factors associated with road traffic crashes among motorcyclists (Miah, M.M. et al.).
- **Health Systems & UHC (Target 3.8):** Our work also supports health systems through research on occupational health, the role of digital finance in health crises, and the integration of indigenous healing practices (Bhowmik, S. et al.; Rahman, M. et al.; Yesmin, S. et al.).

Pillar 2: Progress through University Operations and Community Engagement

NSTU's operational strategy translates our research commitment into direct, tangible actions that promote health and well-being on our campus and in the surrounding community.

Section 2.1: Education for Health Professions

We are committed to training the next generation of healthcare professionals. In 2024, 76 graduates, out of a total of 1,541, were from our health profession programs.

Section 2.2: Health Collaborations and Services

Our Department of Pharmacy maintains an active collaboration with the Noakhali 250 Bed General Hospital. This partnership allows our students to undertake a three-month internship, enhancing their practical skills and contributing directly to improved local health and well-being outcomes.

Section 2.3: Community Outreach

NSTU delivers impactful outreach programs to the local community.

- **Emergency Support:** The Department of Pharmacy's Emergency Medical Service Team provides essential healthcare support (image attached on the left) to flood-affected communities, with student volunteers distributing medicines, water purification tablets, sanitary napkins, and oral saline.
- **Shared Facilities:** We provide limited, supervised, and free access to our main playground and open fields for local schools and youth clubs for non-commercial community events and tournaments.

Section 2.4: Student Health and Well-being

We provide comprehensive, free-of-charge health services to our students.

- **Sexual & Reproductive Health:** The Shaheed Mugdho Medical Center offers free, confidential access to services, including consultations, counselling, and emergency care.
- **Mental Health:** The university provides free access to a dedicated psychologist and actively promotes mental well-being through workshops (image attached below, left side) on emotional intelligence and stress management.

Section 2.5: Staff Mental Health

This support is extended to our staff, who also have free access to the university's dedicated psychologist and are included in workshops (image attached above, right side) designed to promote emotional resilience and well-being.

Section 2.6: Smoke-Free and Substance Control Policy

NSTU is committed to a safe and healthy campus environment. We have a formal "Smoke-Free and Substance Control Policy" that aligns with national law. This policy:

- Prohibits smoking and vaping in all university buildings, transport, and public spaces (walkways, canteens, etc.).

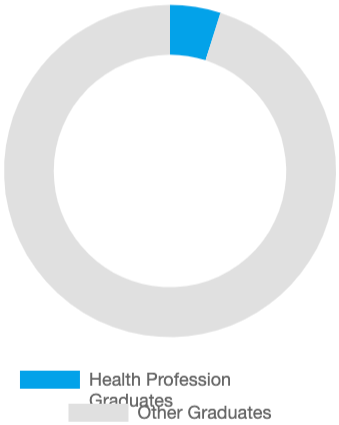
- Allows for designated smoking zones in specific outdoor locations, away from public congregation.
- Strictly forbids the sale or promotion of tobacco products on campus.
- Strictly prohibits the possession, use, or distribution of any narcotic substance.
- Is enforced by the Proctor's Office and supported by awareness campaigns.

Pillar 2: Operations – Campus & Community Health

We translate research into action through education, direct health services, and community outreach.

Graduates in Health Professions (2024)

Training the next generation.



76 of 1,541 graduates are from health professions.

Key Health Services

Clinical Collaboration
Internship program with Noakhali 250 Bed General Hospital for pharmacy students.

Student & Staff Mental Health
Free, confidential access to a dedicated psychologist and mental health workshops.

Student Reproductive Health
Free consultations, counselling, and services at the on-campus medical center.

Community & Policy

Community Outreach
Emergency Medical Service Team provides aid (medicine, hygiene kits) to flood-affected communities.

Smoke-Free Policy
Smoking is prohibited in all buildings and public spaces, with designated outdoor zones.

Conclusion

The sheer volume and comprehensive breadth of our 136 publications in 2024, combined with our direct operational support, underscore an institutional-level commitment to SDG 3. We are not only identifying environmental and NCD/CD health crises but are actively building the AI-powered diagnostic tools and evidence-based policies needed to solve them. From computationally-designed vaccines to providing free mental health support on campus, NSTU provides a 360-degree approach to ensuring healthy lives and promoting well-being for all.

Appendix: SDG 3 Targeting 2024 Publications Referenced

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2. Lipi, J.A., Belal Hossain, M.B., Jolly, Y.N., Arai, T., Yu, J.J. (2024). Response of benthic assemblages to heavy metal contamination from shipbreaking operations in a tropical coastal area. *Regional Studies in Marine Science*.
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4. Tajwar, M., Rahman, M., Shreya, S.S., Alam, M.M.T., Zahid, A. (2024). Pollution evaluation and health risks assessment of naturally occurring toxic metals in shallow groundwater: A study in southwestern tidal delta of Bangladesh. *Journal of Trace Elements and Minerals*.
5. Siddiquee, N.H., Hossain, M.I., Priya, F.M., Tuly, F.I., Hossain, A. (2024). Nature's defense against emerging neurodegenerative threats: Dynamic simulation, PCA, DCCM identified potential plant-based antiviral lead targeting borna disease virus nucleoprotein. *Plos One*.
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