Draft Call Specifications for the PCHRD 2024 Calls: OMICS and BIOMED

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OMIC Technologies for Health Program

The **OMIC Technologies for Health Program** utilizes information from different 'OMIC' technologies, such as genomics, transcriptomics, proteomics, metabolomics and bioinformatics, as input to the development of precision medicine, diagnostics, therapeutics, and as a support to health & clinical practice guidelines and policies of the Philippines.

The continuity of the country's long-term investments in OMICS research is ensured in this current Call for Proposals, which will focus on building on the collective success of the previous projects and programs while encouraging the submission of proposals on other important but often overlooked health research and policy issues. Neuroscience OMICS, cancer research, researches on rare diseases, translational studies on NCDs, and population and forensic studies will be at the forefront, along with the possible adaptation of the genomic biosurveillance model developed for SARS-CoV-2 strains to other emerging and re-emerging disease.

In particular, the following topics are being identified:

1. **Multi-omics approach on Health and Diseases**
    a. Cancers, including lung, liver, colorectal, etc.; may include use of proteomics or metabolomics approaches
    b. OMIC researches in neurosciences: focus on established neurological, neurodegenerative, or psychiatric diseases of relevance in the Philippines
    c. Studies on pre-, peri-, and post-partum conditions affecting maternal and child health
    d. The use of OMIC technologies in addressing malnutrition among children and adults

2. **Genomic Epidemiology Studies: Infectious Diseases; Rare Diseases**
    a. Expanding genomic biosurveillance coverage to include Infectious diseases of priority in the Philippines using next-generation sequencing
    b. Researches on the incidence and prevalence of rare diseases of relevance in the country (following Republic Act 10747 "Rare Disease Act") using genomic biosurveillance

3. **Translational Omics Research for Precision Medicine**
    a. Validation of discovered biomarkers for NCDs among Filipinos on the following: cardiovascular diseases, diabetes mellitus, different cancers
    b. Functional studies (pharmacokinetic studies, cellular models) arising from pharmacogenetic studies on NCDs and cancers
    c. Research on novel therapies for cancer using Filipino OMICs data
    d. Establishing a national reference sequence for Filipino diseases such as NCDs and cancers
    e. Host immune responses for infectious diseases

4. **OMICS for Forensics, Ethnicity, and Population Studies**
    a. Filipino population OMICs studies
    b. Forensic DNA profiling technology studies

1. Multi-omics approach on Health and Diseases

The use and integration of multiple platforms such as genomics, transcriptomics, proteomics, metabolomics, and bioinformatics/ AI/ computational pipelines is essential to provide a more comprehensive view of a specific human condition, e.g. disease or state of health.

Through this multi-perspective approach, it is envisioned that more comprehensive information regarding diseases/ conditions of utmost importance in the country will be generated, and in greater resolution. This information is expected to be translated into **tools for pre-emptive lifestyle intervention, better disease diagnosis and prognosis, prediction of treatment responses, as well as targets for development of diagnostics and therapeutics, focused on the Filipino population.**

Specific Priorities	Description	Expected Output/s
1. Cancers a. Leukemia b. Prostate c. Cervix d. and others 2. Neurological, neurodegenerative, or psychiatric diseases of relevance in the Philippines a. Cerebrovascular disease b. CNS neoplasms c. Seizure disorders d. Movement disorders e. Dementia f. and others 3. Studies on pre-, peri-, and post-partum conditions affecting maternal and child health 4. The use of OMIC technologies (i.e. metabolomics) in addressing malnutrition among children and adults	Proposals may cover any or all of the following: 1. Fundamental research: discovery and validation of biomarkers as biological signatures in signatures of the pathophysiology associated with the specific disease/ condition 2. Integrating bioinformatics/ computational/ machine-learning pipelines and/or technologies with discovery/ validation of clinically biomolecular markers/ signatures for diagnosis, patient stratification, prognosis or monitoring or prediction of treatment/ therapy/ intervention response and side effects for the specific disease/ condition 3. Integrating local -OMICs data with clinical and/or epidemiological research for a more holistic insight on disease causation	Outputs may cover any or all of the following: ● List/ database of biomarkers, biological signatures ● Computational/ machine-learning pipelines and/or technologies (.e.g software tools, programs, etc) integrating clinically relevant biomolecular markers/ signatures, which can be used/ further developed for diagnosis, patient stratification, prognosis or monitoring or prediction of treatment response and side effects, etc. ● Better/ more informative biological/ disease models incorporating informative of diagnosis, prognosis, treatment evaluation/ response ● Evidence/data for policy formulation clinical practice guidance, more appropriate tools for health interventions, leading to better health outcomes

2. Genomic Epidemiology Studies (Infectious Diseases, Rare Diseases)

The Genomic Epidemiology area involves the use of genomic technology platforms and associated technologies to actively gather, analyze and interpret data related to disease activity and threat in order to provide early warning of health threats, early detection of health events, and overall situational awareness of disease activity.

Proposals in this topic are advised to carefully look into existing genomic epidemiology studies/ programs, to make sure that there will be no duplication.

Specific Priorities	Description	Expected Output/s
1. Infectious diseases of priority in the Philippines 2. Rare diseases of relevance in the country	Involves use of genomic technologies and systems that will enhance the efficiency and sensitivity of biosurveillance including how to scale and sustain these systems.	Outputs may cover any or all of the following: ● Genomic biomarkers and scalable/ sustainable systems for enhanced biosurveillance ● Evidence/data for policy formation, clinical practice guidance, improved systems/ tools leading to better health surveillance and interventions.

3. Translational Omics Research for NCDs for Precision Medicine*

The Genomic Epidemiology area involves the use of genomic technology platforms and associated technologies to actively gather, analyze and interpret data related to disease activity and threat in order to provide early warning of health threats, early detection of health events, and overall situational awareness of disease activity.

Proposals in this topic are advised to carefully look into existing genomic epidemiology studies/ programs, to make sure that there will be no duplication.

Specific Priorities	Description	Expected Output/s
1. Cardiovascular Diseases; 2. Diabetes Mellitus; 3. Cancers of relevance / priority in the country a. Lung b. Liver c. Colorectum d. Breast 4. Host immune response for infectious diseases	1. Validation of clinically biomolecular markers/ signatures for diagnosis, patient stratification, prognosis or monitoring or prediction of treatment response, and targeted therapies 2. Functional studies (pharmacokinetic studies, cellular models) arising from pharmacogenetic studies on NCDs and cancers	Outputs may cover any or all of the following: ● Validated, Clinically relevant biomolecular markers/ signatures, for better disease stratification, prognosis or monitoring or prediction of treatment response, and targeted therapies ● Evidence/data for policy formulation clinical

	3. *Proof-of-concept* researches on novel therapies (small molecules) for cancer using Filipino OMICs data	practice guidance, more appropriate tools/ systems for health interventions, leading to better health outcomes ● Established national reference sequence for Filipino diseases such as NCDs and cancers

**Wafi, A., Mirnezami, R. (2018). Translational –omics: Future potential and current challenges in precision medicine. Methods, 151, 3–11. https://doi.org/10.1016/j.ymeth.2018.05.009*

4. OMICS for Forensics, Ethnicity, Population Studies		
The practical applicability of population OMIC studies in the country is exhibited by its contribution to ethnic and forensic research and practice. The Council would like to build on the findings of previous population and forensic OMIC research, in particular, through the development of tangible applications of generated data. *Note: Proposals that build from previous DOST/ PCHRD funded research will be given priority.*		
Specific Priorities	**Description**	**Expected Output/s**
1. Filipino Population OMICs Studies 2. Forensic DNA Profiling Technologies	Validation and application of Filipino genomic data in forensic sciences and population studies	Outputs may cover any or all of the following: ● Locally-developed kits/ technologies in support of the Philippine criminal justice system ● Filipino-specific sample resource and population reference database/ sample bank

Biomedical Devices Engineering for Health

The Biomedical Devices Engineering for Health or BIOMED program aims to develop accessible, affordable, good-quality, and innovative biomedical devices that consider sustainability of materials, manufacturing processes, and products; to develop skills and expertise in biomedical engineering and related areas, and; contribute to establishing and strengthening support systems towards a Philippine Biomedical Devices Industry.

To ensure that we continuously support and elevate the Biomedical Devices Innovations in the country, we are identifying the following research topics for the upcoming Call for Proposals:

1. Technology-assisted surgical innovations for patient safety
2. Innovations in Local Implants Development
3. Devices for Postoperative / Rehabilitative / Assistive Care
4. Devices for Health Emergency Preparedness and Response
5. Biomedical Engineering Devices in support of Universal Health Care
6. Simulation platforms for health and disease studies

1. Technology-assisted surgical innovations for patient safety		
This research area looks into surgical equipment which will result in more accessible/ affordable devices, will utilize/ harness local resources, and will be more appropriate for the Filipino build - all taking into consideration patient safety, local clinical practice guidelines, local health service provision and international markets.		
Specific Priorities	**Description**	**Expected Output/s**
Minimally Surgical devices, tools and aids that can be used in either endoscopic or robotic-assisted surgeries.	Minimally-invasive surgical equipment limits the size of incisions needed during surgeries to lessen wound healing time, associated pain, and risk of infection - Benefits of minimally-invasive surgical equipment include: · Smaller incisions · Less pain · Low risk of infection · Short hospital stay · Quick recovery time · Less scarring · Reduced blood loss - New equipment designed with the Filipino user in mind - Modification of existing tools which are incompatible to the Filipino build - Devices that are more suitable in the Philippine surgical environment	● Locally-developed, surgical equipment ready for clinical testing/ commercialization ● More affordable / accessible surgical device alternatives ● Better-suited surgical tools for Filipinos

2. Innovations in Local Implants Development

This research area aims to develop implants that are locally designed and sourced which can be used for surgical and non-surgical clinical devices. Ensuring patient compatibility safety should be paramount in developing these devices.

Specific Priorities	Description	Expected Output/s
Development of local implants Wearable/subcutaneous implants	New materials for implant manufacturing - Implants for reconstructive surgery - Non-surgical Implants/ soft-tissue Implants used for: - Detection of symptoms - Monitoring of body functions	● Locally-developed, implants ready for clinical testing/ commercialization ● Policy recommendations how to enable increased, equitable healthcare access using medical technology innovations

3. Devices for Postoperative / Rehabilitative Care

This research area focuses on smart biomedical devices that can lessen healing time and/or assist the specific body part to perform movement in which improvement can be monitored through built-in sensors and IoT as the treatment progresses. Materials and processes sustainability and innovation should also be factored in this area.

Specific Priorities	Description	Expected Output/s
Development of smart biomedical devices that can be used for movement rehabilitation	Biomedical devices that can: - lessen healing time - assist the specific body part to regain/perform movement - monitor treatment progress through built-in sensors and IoT - utilize local and sustainable materials	● Locally-developed, devices and protocols ready for clinical testing/ commercialization ● Low-cost rehabilitative devices

4. Devices for Health Emergency Response

This research area involves the development of *local biomedical devices* that will equip healthcare providers, first responders, and the public for health emergencies such as pandemics and environmental disasters.

This topic also includes development of low-cost but still good quality emergency room equipment that can be alternatives in low-resource settings.

Specific Priorities	Description	Expected Output/s
Development of biomedical devices used for: 1. Health emergency situations	Biomedical devices that are critical for timely and continued access of the public during health emergency situations (i.e. wound management, mobility assistance, Emergency room/ Operating room equipment etc.).	● Locally-developed, devices and protocols ready for clinical testing/ commercialization ● Portable and durable emergency devices
2. Disaster response	Biomedical devices that can be readily used during disasters (especially during power and water disruptions).	
3. Pandemic	Biomedical devices that can easily be used during pandemics, such as but not limited to: - Masks and respirators - Ventilators and other ventilation-related Devices - Innovative Personal Protective Equipment (PPEs) for ***Health emergency workers/ responders***	

5. Devices for Postoperative / Rehabilitative Care		
Distributed Healthcare and Devices aims to de-centralize health care provision by shifting from facility-based to patient-focused health care. This research area envisions innovations that will support facility-based health management, and increase access to healthcare such as in geographically-isolated and disadvantaged areas (GIDAs). This topic also includes development of low-cost but still good quality hospital equipment that can be alternatives to low-resource settings.		
Specific Priorities	**Description**	**Expected Output/s**
1. Development of assistive devices (e.g. prosthetics, orthotics)	Biomedical devices that can maintain or improve an individual's functioning and independence to facilitate participation and to enhance overall well-being, specifically: - Artificial body part replacement (prosthesis) and orthosis	● Locally-developed devices and protocols ready for clinical testing/ commercialization ● Evidence / data for policy formulation clinical practice guidance, more appropriate tools /

2. Devices for better Primary Health Care provision a. Elderly/ geriatric care b. Maternal and Child care	- Mobility aids for PWDs Ensuring innovative, yet accessible technologies for elderly/ geriatric care, and maternal/ child care which can be deployed in the Primary Health Care Setting	systems for health interventions, leading to better health outcomes

6. Simulation platforms / tools for Health and Disease Studies		
This research area aims to develop bioengineered devices that will support / augment: 1) Disease studies, and 2) Training of Medical students / professionals.		
Specific Priorities	**Description**	**Expected Output/s**
1. Bioengineered tissues; "organ-on-a chip", simulated body parts;	Development of biomedical devices e.g. microfluidic systems and/ or tissue engineering to simulate tissue- and organ-level physiology for studies on disease etiology, or as possible alternatives for skin grafts or transplantation of organ parts	● Locally-developed, devices and protocols ready for clinical validation ● Locally-developed, devices and protocols ready for validation/ commercialization
2. Locally-developed Tools/ devices for medical training	Devices and Tools for Training of Medical students/ professionals, such as medical dummies, surgery simulators and tools (non-software-based)	

BIOMED: ***Considerations in formulating the proposals***

1. The proposal should provide a clear value proposition, i.e., *why the proposed output / device will have more value compared to what is already available*. Moreover, competition analysis should be included.
2. Proposals should be developed with the end-users in mind, e.g., clinicians, relevant healthcare workers, patients, etc. Proponents are advised to collaborate and obtain inputs from these end-users even at the prototyping stage.
3. For Proposals / Programs, a five-year development-to-commercialization (or technology transfer) plan should also be included, clearly stating the device development phase, testing phases, clinical trials, re-engineering, and commercialization phases. Target milestones should also be clearly identified.
4. Proponents are encouraged to partner with DOST-funded facilities such as the Advanced Manufacturing Center (DOST-AMCEN), Electronic Products Development Centre (DOST-EPDC), DOST-PTRI Medical Textile Testing Facility, etc.

General Considerations / Guidelines in Formulating Program / Project Proposals

1. Proposals are encouraged to harness or build on existing studies / data, resources, and technologies for further development. Some diseases / conditions may already have information, e.g., clinically-relevant biomarkers/ molecular signatures therefore not needing new studies on biomarker discovery / validation.
    a. If the proposal will be positioning itself as “pioneering” (e.g., involve discovery of new biomarkers, or focusing on a topic wherein no previous research has been done), compelling justification / arguments must be clearly stated in the proposal to justify the need for the research.
    b. **For any proposal, the state of research, especially in the country, should be discussed thoroughly, including how the proposed outputs will contribute to better health outcomes, addressing the gaps, and/or improvement of existing health programs.**

2. Rationale behind the choice of disease / condition, proposed study framework / biological model / methodology, etc. should be strongly justified and supported by relevant data.

3. Proposals should be clear on how the expected outputs / outcomes will lead to better health outcomes. For Program Proposals (or proposals requesting for significant resources), consider including a “Program Research Roadmap" in the “Expected Outputs / Outcomes”, illustrating expected milestones / outputs per implementation year, and succeeding researches, especially *translational studies* that will have to be undertaken beyond the proposed project implementation period—to achieve the Program Outcomes. *This is separate from the Project Workplan / Gantt Chart*.

4. Plans for data sharing / access should be included in the proposal, e.g., sharing research outputs to other researchers / groups who might be interested in further collaboration.

5. Proposed resources must be justified, especially if these will involve significant Capital Outlay. As stated in the DOST Grants-in-Aid Guidelines, counterpart funding from the Implementing Agency must be provided.

6. It is encouraged that Program Proposals be multi-institutional / collaborative. In addition, relevant stakeholders (e.g., clinicians, government programs) should be engaged / consulted, even at the device development stage. For proposals that will involve clinical trials / human trials, the proposal should already include study design details for the clinical trials phase.