

Healthy Asia, Healthy Singapore

SDGHI Strategic Plan 2020-2024

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Healthy Asia, Healthy Singapore

Executive Summary

'*Healthy Asia, Healthy Singapore*' presents the SingHealth Duke-NUS Global Health Institute's (SDGHI) overarching goals and plans for the next five years. The Institute aims to pursue interdisciplinary education, research, policy and capacity building initiatives in an integrated manner through sustainable and scalable health programmes.

With the central mission to improve health and well-being in Southeast Asia, SDGHI aims to contribute to three aspirational goals: i) **improve health outcomes**, ii) **increase health security** and iii) **strengthen health systems**. Attention to the issue of health equity is a key underlying principle for SDGHI.

Over the next five years, SDGHI will focus its work in specific areas that are highly relevant to improving health outcomes in the region. These include: 1) research on Asian cancer; 2) a global surgery programme; 3) research, education and outreach on eye diseases; 4) research on cardiovascular and related diseases and 5) skills enhancement and training for allied health workers.

Southeast Asia remains vulnerable to many threats from various infectious diseases. In an effort to increase health security, SDGHI will work with cross-sectoral partners to help build laboratory capacity, conduct disease surveillance, devise policies for outbreak response and preparedness and create collaborative disease prevention strategies to reduce illness and mortality in neighbouring countries. Emphasis will be placed on emerging diseases of viral origin.

Health systems strengthening (HSS) is a recognised priority across the health development field. It includes investing in inputs such as physical infrastructure and the health workforce and reconfiguring how the different parts of the system operate and interact to meet the needs of the populations they serve. A bedrock of HSS is the improvement of the primary healthcare infrastructure to increase access to and quality and affordability of essential health services and technologies. SDGHI will conduct research in these areas.

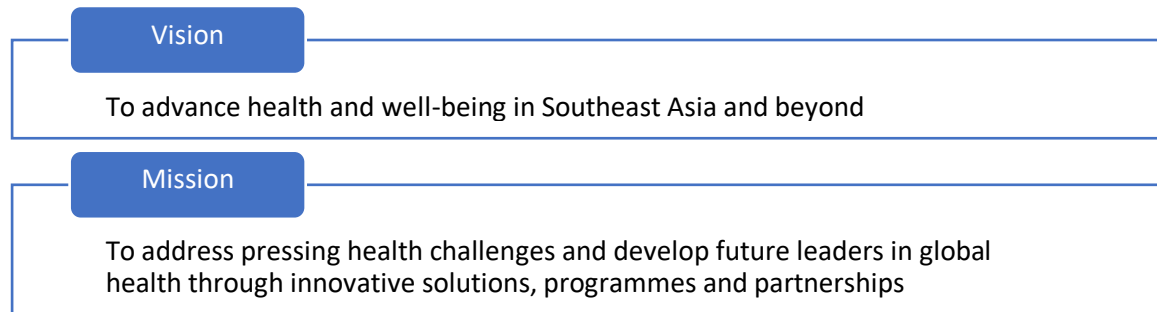
In addition to its research programmes, SDGHI will undertake key initiatives in the educational domain. These include: support for research projects for 3rd year Duke-NUS medical students; an introductory global health educational programme for SingHealth Residents; a Masters of Public Health (MPH) Global Health Fellowship; a Global Health Scholars Track established under the Duke-NUS PhD programme; support for experiential learning opportunities for medical students and residents; a modular-based, Certificate Programme in global health; internship opportunities and a regularly held global health seminar series.

SDGHI will develop a robust partnership network of academic institutions in the region. We will be committed to working with our partners to develop local capabilities, cultivate a strong research culture and ensure sound operational processes. Within Singapore, SDGHI will collaborate with institutions in the academic, non-profit, government and private sectors to expand its work within and beyond the medical sciences to broaden its impact on global health.

I. Introduction

Vision and Mission

SDGHI's vision and mission are as follows:



SDGHI provides a coordinating and operating framework to facilitate work across SingHealth and Duke-NUS Medical School's Signature Research Programmes (SRPs), Academic Clinical Programmes (ACPs), Institutes and Centres. SDGHI's success depends on participating in multidisciplinary collaborations and building strong linkages across these entities. Our primary focus will be on global health challenges and opportunities in the ASEAN (Association of Southeast Asian Nations) region.

SDGHI is organised into and operates around four 'Core' areas: Research, Education and Training, Policy and Capacity Building. These four Cores aim to achieve the following objectives:

Research	Education and Training	Policy	Capacity Building
Promote and conduct research that addresses prevalent health issues and burden of disease	Be a leader in interdisciplinary global health education and training	Promote health policy excellence to strengthen health systems, access and coverage	Enhance the capacity of regional institutions to improve health through robust collaborations

The SDGHI Cores work together synergistically to share knowledge, ideas, opportunities and resources to increase effectiveness and maximise impact. Each Core plans activities and coordinates faculty working in their areas while facilitating inter-Core opportunities for collaboration across SDGHI as well as collaborations with the SRPs and ACPs in the SingHealth Duke-NUS Academic Medical Centre (AMC). For example, third year medical students will undertake research in locations where SDGHI faculty have ongoing projects. Capacity building activities will build upon existing research and education collaborations. Policy initiatives will draw on evidence based research undertaken by SDGHI faculty and will provide opportunities for medical students and residents to undertake policy related research.

Background

While global health has many facets, the key pillars that are universally acknowledged include a focus on improving health and achieving health equity for all people and an emphasis on transnational health issues, determinants and solutions. Global health is characterised as a multidisciplinary endeavour that creates links across sectors and promotes interdisciplinary collaborations. In practical terms, attention to global health issues can result in saving millions of lives, in reducing health disparities, in securing protection against global health threats and, beyond the realm of health, in promoting productivity and economic growth.

Given its well-developed economy as well as its robust infrastructure in health delivery, health education and research, Singapore has an important leadership role to play in the field of global health. Southeast Asian countries face high incidences of non-communicable diseases (NCDs), such as cardiovascular disease, cerebrovascular disease, cancer and diabetes, as well as continuing threats of infectious disease outbreaks. Singapore has experience tackling these diseases and, as such, is well positioned to address these health concerns at home and abroad. By engaging in global health activities, Singapore will benefit from deepening its expertise in both research and educational capabilities, generating goodwill with neighbouring countries and strengthening its own health security as well as the health security of the region.

The rationale for establishing a global health institute developed from the growing realisation across the AMC that an incorporation of global health initiatives is essential to grow the AMC in outreach, reputation and expertise.

SDGHI combines the strengths of SingHealth and Duke-NUS. Over fifty faculty across the AMC are involved in a wide array of global health research, education, policy and capacity building projects and activities in the region. At Duke-NUS, the majority of global health research projects are conducted by faculty in the Programme in Emerging Infectious Diseases (EID) and the Programme in Health Services and Systems Research (HSSR). Duke-NUS has also made important inroads in the area of regional policy development through the Centre of Regulatory Excellence (CoRE) which has established relationships with national regulatory authorities across Southeast Asia. At SingHealth, many research projects are undertaken by faculty in the National Cancer Centre of Singapore, the Translational Immunology and Inflammation Centre, the Department of Emergency Medicine at Singapore General Hospital, the National Heart Centre of Singapore and the Singapore Eye Research Institute (SERI).

Medical students have also demonstrated a strong interest in global health. The Duke-NUS Overseas Volunteering Expedition (DOVE), which is a student-organised, international medical mission, has been extant for 10 years and is very popular among students eager to be exposed to global health learning. In addition, residents, fellows and faculty undertake capacity building—in clinical skills as well as research capabilities—and humanitarian projects throughout Southeast Asia.

Many Duke-NUS and SingHealth faculty participate in regional consortia, networks and conferences that bring together experts in their fields of research, education, policy formation and clinical care.

SingHealth, through its International Collaboration Office, has undertaken 37 capacity building projects spanning 12 Asian countries since 2013. These projects have provided short-term, often refresher, training to some 8000 healthcare workers, including doctors, nurses and allied health professionals.

SDGHI will provide a platform for faculty and students to expand their global health work, build meaningful collaborations, inject academic rigour and establish sustainable partnerships to improve health across the region. SingHealth and Duke-NUS healthcare practitioners and researchers stand to benefit greatly from collaborating and working outside Singapore. Exposure to a wide variety of complex cases and diseases will help them gain rich clinical experience and give them opportunities to develop innovative solutions to improve health outcomes. Moreover, SDGHI will foster bi-directional learning between researchers and practitioners across the region. This will ultimately nurture a strong pipeline of healthcare practitioners, attract a more diverse student population to Duke-NUS Medical School and raise the AMC's position and reputation.

The leadership of both SingHealth and Duke-NUS are strong advocates of the establishment of SDGHI. The establishment of the Institute gained high-level government support from the Singapore Minister for Foreign Affairs, who participated in the launch of the Institute in September 2018.

II. Overview of our Strategy

Goals

Given the wide array of opportunities and challenges in global health and recognising the need to focus our efforts, this document lays out three aspirational goals to which SDGHI aims to contribute:

- 1) **improve health outcomes**
- 2) **increase health security**
- 3) **strengthen health systems**

The next section elaborates these goals and outlines how SDGHI intends to achieve them.

Global health principle

The achievement of our goals will rest on the principle of aligning our activities to advance health equity; with equity being defined as the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically or geographically. The recognition of health equity as an underlying principle of global health is reflected in the 2030 Agenda for Sustainable Development which seeks to "leave no one behind" (United Nations, 2019) and is an integral aspect of global health. Health equity is influenced by underlying social, economic, political and environmental factors known as social determinants of health that include education, employment status, income level, gender and ethnicity. Wide health inequities within and between different social groups are prevalent in all countries. These inequities have significant social and economic costs to both individuals and their societies. Attention to the issue of

health equity is especially important in the context of developing economies where different groups of people have varying degrees of access to the health system. Whereas this variance in access to health lies largely in the socio-economic realm, health equity issues can be addressed from within the health sector by strengthening the health system to be responsive, affordable and accessible to all groups.

SDGHI will pay special attention to gender equity. According to the World Health Organization (WHO), “Gender refers to the roles, behaviours, activities, attributes and opportunities that any society considers appropriate for girls and boys, and women and men. Gender interacts with, but is different from, the binary categories of biological sex.” Traditional gender norms can cause inequities in health seeking behaviour, access to healthcare, adequate treatment and improved health outcomes.

To date, academic literature has paid limited attention to the relationship between health and gender equity issues in Southeast Asia—SDGHI will encourage its faculty to focus on this issue and help fill this gap.

Approaches

Achievement of SDGHI’s goals will rest on the following approaches:

1. Building a global health community and constituency

Our Education and Training Core intends to develop the next generation of global health leaders, preparing them to meet future global health challenges, particularly in Southeast Asia. Our global health education and training programmes aim to produce researchers, policy makers and practitioners with the ability to improve the health of populations throughout Southeast Asia through interdisciplinary, ethical and innovative scholarship, practice and collaborations.

The key education and training priorities and activities will cover a wide range of learners as follows:

- i. **Medical students** will be able to take a range of global health courses that will be built into their curriculum over the next two years. Additionally, experiential learning opportunities and structured learning experiences will be made available to all Duke-NUS students. Third year students will be able to undertake a global health research project funded and facilitated by SDGHI.
- ii. **SingHealth residents’** curriculum will add an introductory global health interactive educational programme that encourages residents’ reflection and discussion to be rolled out in all ACPS over a three-year period. They will also be provided with opportunities for experiential service learning in global health.
- iii. A Global Health Fellowship programme, to be initiated for the academic year 2020-2021, will enable **SingHealth fellows** to enrol in the Saw Swee Hock School of Public Health (SSHSPH) Masters of Public Health (MPH) global health concentration. SDGHI will partner with SSHSPH to help facilitate this. This programme will provide SingHealth fellows with a deeper understanding of global health while they complete their clinical training. The programme will enhance their didactic and practical

knowledge in global health prevention and care and require them to participate in a global health research project at an overseas institution. This training will facilitate careers in global health and provide a pipeline of experts across the ACPs who will benefit from having dedicated well-trained faculty undertaking research projects involving social innovations and building capacity in field locations near and far, thus benefitting our local and regional communities in need.

- iv. **Duke-NUS PhD students** will be able to enrol in a global health scholars track established under the Duke-NUS PhD programmes. This will enable them to undertake their doctoral research on a global health topic that they can continue to pursue in their future careers.
- v. **Faculty** across the AMC will have the opportunity to enhance their knowledge in global health and their ability to teach in global health settings through organisation of short courses and workshops and faculty development activities specific to global health.
- vi. A new global health course (covering ethics and medicine in low-resource settings with a Southeast Asian focus) will be conducted for **interested students and faculty** throughout the AMC.
- vii. **Students, faculty and the AMC community** will be exposed to current global health priorities and research findings through a regularly held global health seminar series.
- viii. A **Certificate Programme** in global health will be introduced. A series of 'stackable' course modules will be developed, which can be taken as standalone courses or in combination to generate enough credits to earn a Certificate. The Certificate Programme will require approval by NUS, be open to all NUS students and the general public and aim to be recognised as a Singapore SkillsFuture eligible suite of courses.
- ix. **Masters students** from the **Duke Global Health Institute** will be encouraged to undertake regional research projects under the joint mentorship of Duke and SDGHI faculty.

2. Expanding research and building capacity relevant to the demographic and ecological profile of the region

While the span of important health issues spreads across many different concerns, SDGHI aims to develop programmes that rest on the identification of needs in regional countries, MATCHED to strengths across the AMC. These programmes will build on ongoing work in the region as well as develop new ones. The programmes will incorporate activities that cut across SDGHI's four Cores and are emblematic of the holistic approach adopted by SDGHI.

Complementing the approach to build global health practitioners in Singapore will be efforts to build research capacity within institutions in ASEAN countries. Developing partnerships with key academic institutions and relevant government entities in the region lies at the foundation of a practical and sustainable approach to expanding research that is both contextually specific and generalisable. In order to have a lasting impact in the region it is important to establish research agendas and capabilities that enable the production of robust evidence for decision making in policy and practice.

Research capacity building includes initiatives to support individuals as well as institutions. SDGHI's first priority will be to identify appropriate academic partners in the region and build collaborative research projects based on the demographic and ecological needs of the country. Appropriate training of research fellows, faculty and clinicians will be structured around the specific requirements and background of the partner institute. In addition to training individuals, attention will be paid to the enabling environment of the partner institute. Institutional development and support of researchers is crucial for the retention and sustainability of developing a sound research infrastructure. Essential components of such an approach includes research support, alignment of incentives and career opportunities, leadership, training, data accessibility, infrastructure and interfaces between researchers and policy makers. While these building blocks are the purview of the partner institutions, SDGHI will focus on the development of academic entities with potential for multidisciplinary collaborations in research, education and policy. Such collaborations will enable these institutions to be responsive to existing and new health imperatives in their own context. This will involve:

- Organisational capacity building at both the structural and process levels.
- Personnel development through skills training related to global health knowledge as well as research capabilities.
- Policy development through building capabilities in impact assessments and systems modelling.
- Attention to gender issues throughout the capacity building efforts.

To build research initiatives in the region, SDGHI will:

- i. Offer its faculty **research grants** to initiate pilot research projects with the long-term goal of enabling investigators to leverage preliminary findings and data to obtain external funding.
- ii. Make **international travel grants** available to SingHealth and Duke-NUS researchers to pursue global health research opportunities. These travel grants provide funds for investigators to visit institutions in the region to explore new research opportunities and develop potential collaborations.
- iii. Establish a new **ACP funding programme** in collaboration with SingHealth Duke-NUS Joint Office of Academic Medicine (JOAM) to seed development of ACP activities in global health to advance SDGHI's priorities. These grant opportunities aim to advance knowledge and/or practice through global health activities.
- iv. Provide **seed funding** to bring collaborators from across the region together to coalesce around specific research topics of interest. This may take the form of symposia, regional meetings and/or forming joint groups for proposal development.
- v. Explore the possible development of small **in-country support offices** to provide critical logistical and research support for SDGHI faculty's collaborative projects in the region.

Section III provides information on some specific areas of research where we plan to be involved.

3. *Strengthening the evidence base for policy initiatives*

Working through its Policy Core, SDGHI will leverage the Singapore, SingHealth, Duke-NUS and CoRE brand names and connections to position Singapore and SDGHI as a hub for regional health policy engagement and thought leadership. It will promote health policy excellence by initially building on CoRE's regulatory and health systems policy efforts and initiatives. It will then expand its areas of work by selecting key issues that are pertinent to countries in the region and present challenges to health and health systems. Bringing evidence to how best to implement needed reforms will be the cornerstone of SDGHI's initiatives.

These efforts will include a focus on the adequacy and effectiveness of national level regulatory policies and regulatory systems capacity for medicines and medical devices, including support for WHO's efforts to promote regulatory convergence across national systems and reliance on decisions of trusted reference authorities to expedite access to medicines. Policy research and support of initiatives to curtail sub-standard and falsified products, while promoting safe and affordable health products, will be important in advancing regional health security. From the current access to medicines perspective, we intend to broaden the scope of research to study access to health at the systems level through cross-country comparisons using an appropriate assessment tool and framework. This will build on existing research to study the impact of health systems policy interventions and innovations in regional countries. Through research collaborations and engaging relevant faculty and adjuncts in Singapore and the region, other areas of health security and health systems strengthening can be subsequently studied, including policy research on specific diseases/conditions, financial protection, ageing, access and quality of care for entire populations (including neglected groups), patient engagement and food security.

As a member of a newly formed WHO Asia Pacific Observatory (APO) research consortium, SDGHI will link with partner institutions in the region to develop policy briefs and comparative studies on specific topics. Building capacities in health systems analysis and policy dialogues is a specific aim of the WHO APO and SDGHI will contribute to this aim by analysing cross cutting policy issues in the Asia Pacific countries, by disseminating findings to policy makers in an appropriate manner and by involving institutions from participating countries in the generation of evidence.

4. *Providing a platform for bringing together diverse partners and stakeholders*

SDGHI will actively seek complementary partnerships with key institutions in Singapore to implement global health activities in the region. Global health requires both local and global partnerships that combine each partner's strengths to further expand outreach and to impact health in the region.

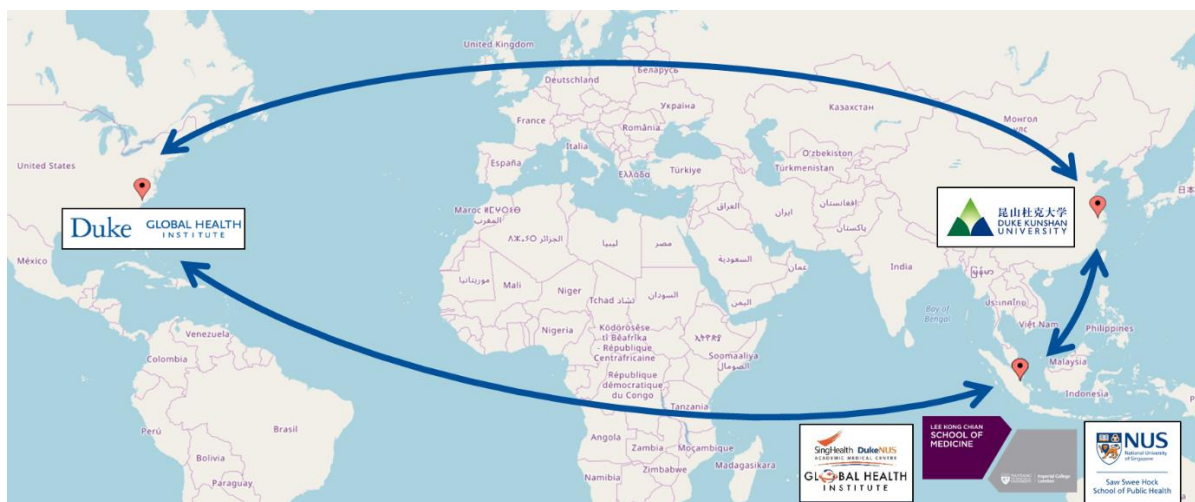
Recognising the importance of global health and the impact it has on Singapore's national security, social stability and economic development, academic institutions in Singapore are expanding their role in global health. SDGHI will actively engage with other institutions such as SSHSPH, Lee Kong Chian School of Medicine (LKCSOM), NTU and Lee Kuan Yew School of Public Policy, NUS that have initiated or participated in global health programmes and activities in the region.

SSHSPH is Singapore's only full-fledged national public health tertiary education institution. As noted above, SDGHI is currently exploring a partnership with SSHSPH to offer a Global Health Fellowship programme for an MPH with a global health track. This programme will build a talent pool of global health leaders for Singapore, benefiting both Singapore and the region.

LKCSOM, Singapore's third medical school, is in the initial stages of developing a new global health centre. In view of the growing emphasis on ageing and population health in the region, SDGHI plans to collaborate with the School to conduct focused interdisciplinary research particularly on NCDs such that we can develop solutions and new practices of medicine that address healthcare challenges faced by the region.

SDGHI, SSHSPH and LKSCOM are in active discussions to ensure coordination of activities and explore opportunities for collaboration with a focus on each one's comparative advantage. These collaborative partnerships will enable us to leverage and complement each institution's expertise and minimise duplication of our global health outreach efforts.

Looking beyond Singapore's shores, SDGHI seeks to engage with and build on the Duke Global Health Institute's (DGHI) ongoing and emerging programmes in Southeast Asia. Faculty to faculty collaborations on specific projects will be encouraged, as will broader engagements across DGHI Centres and Initiatives. We also seek to build collaborations with global health faculty working at Duke Kunshan University in China.



5. Identifying and implementing innovative approaches

We are in discussions with DGHI and Duke University to establish a regional Duke/Duke-NUS led platform for infectious diseases research. This collaboration will utilise a hub and spoke model—with Singapore as the hub and initial proposed spokes being institutions in Cambodia, Sri Lanka, Vietnam and Myanmar where faculty in SDGHI and DGHI have ongoing collaborative research. This hub will help address two key difficulties: i) funding for collaborative work in regional countries and ii) facilitation of logistics of movement of samples. Discussions are also underway to develop a regional network of collaborators to develop capabilities for outbreak preparedness in the region.

Across various research projects, SDGHI faculty are committed to developing and evaluating innovations in the use of digital technologies, new devices and new models of care in the region. Opportunities to build a body of evidence that is generalisable and reproducible will actively be sought. A focus on the sustainability and impact of specific interventions will be maintained.

Geographic scope

As noted above, SDGHI proposes to develop priority partnerships with institutions located in the ASEAN region. The region is an important network of countries with economic, political and social ties to Singapore. These partnerships will generate goodwill between Singapore and its regional neighbours while strengthening health security in the region. The exchange of knowledge and expertise, which will include training next generation scientists and physicians, allows for more rapid progression of therapeutic and other scientific breakthroughs and corresponding improvements in population health.

Existing collaborations and research projects across a number of countries in Southeast Asia suggest that a coordinated approach is required.

Example:

Collaborations in Cambodia, Vietnam and Thailand and potential new partnerships in Laos and Myanmar could be coordinated under the framework of a 'Mekong River Health Initiative.' By paying special attention to key aspects of the health sectors of these countries, SDGHI will be able to streamline the use of its resources—both financial and human—by undertaking activities that are cross border, generalisable and/or translatable.

Over time, and when opportunities for partnerships with academic institutions across Southeast Asia present themselves, SDGHI will seek to develop relationships grounded on the principles of collaborative partnerships and production of academic outputs.

III. Putting Our Strategy into Action

As mentioned in the section on *Approaches*, activities under the four Cores of Research, Education and Training, Policy and Capacity Building will not be carried out in isolation of each other. An integral aspect of the programmatic approach we will utilise is the intersecting activities of these Cores. We aim to undertake research in close collaboration with appropriate academic partners. The collaboration will rest on the foundation of building capacities in the partner institutes so that the research work is sustainable in the long run. Varied dimensions of research and educational capacity building will be incorporated into the mode of collaboration. Policy initiatives will be built on evidence based research undertaken with key stakeholders. Dual opportunities for educational exchanges will be established where feasible. Such exchanges will be multi-dimensional and can include: research projects for our medical students, residents, fellows and doctoral scholars; fellowships to spend time

in SingHealth Duke-NUS clinical and academic institutes; targeted training in research methods and laboratory procedures, etc.

The sections below explicate key research, education, policy and capacity building areas in which SDGHI faculty are currently involved in and highlight a few areas that we aim to develop in the near future. It is important to point out that this list is not a closed one; as our resources—both financial and human—increase, we envisage that in time the scope of our work will expand both in areas of focus and location. The range of relevant potential topics spans the spectrum of health and healthcare issues (for example, maternal and child health, mental health, palliative care, accidents and injuries, etc.) in which SDGHI faculty engage.

Goal 1: Improve health outcomes

The final accounting of any health entity must be in improved health outcomes for the target population. For SDGHI, the target populations will be the ASEAN nations with a special focus on vulnerable groups within countries. Improvements in health outcomes should be viewed in the broadest way and include increases in life expectancy, decreases in mortality and morbidity from avoidable causes and improvements in quality of life due to health conditions. Over the next five years, SDGHI will focus its work in specific areas that are highly relevant to improving health outcomes in the populations defined above.

1. Research on Asian cancer

Asia accounts for 60% of the world population and half the global burden of cancer. Due to ageing populations, changes in lifestyle and socioeconomic and environmental factors the incidence of cancer cases is estimated to increase from 6.1 million in 2008 to 10.6 million in 2030 (Sankaranarayanan, Ramadas, & Qiao, 2014). While there is much heterogeneity across ethnic and sociocultural practices, habits, dietary patterns and a range of economic and infrastructural factors in different Asian countries, there is a common imperative to recognise an increasing burden of cancers in the different regions of Asia. For example, cancers prevalent in Asia (as in Africa) are more commonly associated with viruses, bacteria and parasites than those in most other regions. In addition, with the burgeoning prevalence of NCD in developing countries in the region, the incidents of newfound cancers associated with metabolic syndromes are expected to rise, while these communities are still trying to tackle extant cancers.

Asian cancers can be represented in several ways:

- i. Cancers that occur more commonly in Asian populations
- ii. Unique characteristics of cancers in Asians (e.g., Asians have been found to be slow metabolisers of certain cancer drugs making them less efficacious in these populations)
- iii. Environmental factors, such as food commonly consumed by Asian populations, can impact how cancer affects these populations
- iv. Traditional herbal medicines used in Asia have been shown to cause specific cancers.

The need to focus attention on cancer is especially true in Southeast Asia where government and international donor attention is primarily directed towards infectious diseases. In contrast, cancer is an important public health problem that receives insufficient attention. It is important for cancer health services to focus on cancer at every stage—prevention as well as early detection of cancers leads to better health outcomes and considerable savings in treatment costs. In addition, research on the aetiology of cancers is complementary to efforts to better prevent and manage cancer. Cancer health services in Southeast Asian countries are still evolving and require substantial investment to ensure equitable access to cancer care for all sections of the population.

SDGHI aims to strengthen and expand the current work streams of its faculty by working closely with the Signature Programme in Emerging Infectious Diseases, the National Cancer Centre and the SingHealth Oncology ACP to develop specific initiatives in Asia cancers.

Building on SDGHI faculty expertise:

SDGHI faculty's expertise in cancer research focuses on both the aetiologies of different cancers as well as collection of data that can inform public health strategies and provide direction to the development of therapeutics.

2. A global surgery programme

Surgery is an essential component of health systems but has often been neglected within global health. As the WHO points out “the common perception that surgical care is merely a luxury in poor countries must be reconsidered and its essential role in global public health must be acknowledged.” There is a growing body of research that documents the cost-effectiveness of essential surgical care in LMICs. Research suggests that an estimated 11% of the global burden of disease can be treated with surgery. This total is composed of injuries (38%), malignancies (19%), congenital anomalies (9%), complications of pregnancy (6%), cataracts (5%) and perinatal conditions (4%) (Ozgediz, Jamison, CHerian, & McQueen, 2008). Furthermore, Southeast Asia has the highest number of surgical disability-adjusted life years (DALYs)—the number used to measure years of life lost due to ill-health, disability or early death—in the region at 48 million (Ozgediz et al., 2008).

Surgical conditions are diverse and occur in every phase of the life cycle; the overall burden is extensive and establishing effective surgical services is a pathway to improve health outcomes. Working in close partnership with the Surgery ACP and other key entities across the AMC, SDGHI intends to develop a robust global surgery programme.

Developing new initiatives:

SDGHI is in discussions to build a neurosurgery programme in Mandalay. This will entail building a continuum of care platform in the selected hospital including guiding and mentoring neurosurgical and surgical camps with the 3Ts: Technology, Training and Twinning. SDGHI will also help identify and build a research portfolio by initially building capacity for data collection, registries and outcomes research. This work will attract medical students (for third year research), residents and fellows.

Another initiative under discussion is a residency exchange programme in Sri Lanka. Currently, under the mentorship of SDGHI faculty and the Surgery ACP, third year Duke-NUS medical students are working with the Sri Lanka College of Surgeons on two research projects. This model is a good example of how such collaborations can serve as a platform for Duke-NUS students who may be interested in global surgery research in their third year. Over time, other similar initiatives will be developed in close collaboration with the Surgery ACP.

3. Research, education and outreach on eye diseases

Recent estimates by the International Agency for the Prevention of Blindness (IAPB) indicate that approximately 300 million people have some form of moderate to severe vision impairment. Ninety percent of all blind and visually disabled people live in LMICs. Considering that vision impairment mainly affects people over 50 and that the Asian population is ageing, eye health is a significant and growing concern in the region. At the same time, many LMICs in the region have inadequate national strategies to improve eye health and eye care is not well integrated into general healthcare systems. The major proportion of the eye disease burden in LMICs is due to refractive errors (rates of myopia have doubled, and even tripled, in some Asian countries in the last 40 years) and cataracts. Systematic interventions to address these conditions can greatly reduce the burden of disease and have an immediate impact on the health status of individuals and a marked improvement in their quality of life.

SDGHI's faculty include global experts in ophthalmology who have their appointments in the Singapore National Eye Centre (SNEC) and its Singapore Eye Research Institute (SERI) and extensive expertise in conducting multicentre randomised control trials across the Asia Pacific region and globally—their areas of focus include glaucoma, diabetic retinopathy and advanced cataract surgical techniques, amongst others. Faculty members are also active in undertaking regional volunteer clinical work in LMICs and are keen to expand these efforts to more sustainable interventions.

Building partnerships:

In partnership with SNEC/SERI faculty, SDGHI aims to augment their expertise and networks to further develop research and capacity building efforts to improve eye care in the region. These efforts will also explore innovative solutions including the use of artificial intelligence and other technological and digital solutions while focusing on creating universal eye care access. Other potential areas of collaboration include opportunities for regional clinical electives and experiential learning programmes in the region.

4. Research on Cardiovascular and related diseases

Cardiovascular diseases (CVDs) caused 15% of total DALYs and 28% of total deaths in Southeast Asia in 2017 (Institute for Health Metrics and Evaluation, 2017). Globally, CVDs are the number one cause of death, with three quarter of these deaths taking place in LMICs. Most CVDs can be prevented by reducing behavioural risk factors such as tobacco use, unhealthy diets, limited physical activity and alcohol intake. LMIC's are increasingly facing the double burden of malnutrition; many countries have a persistent burden of undernutrition but are now also seeing increasing prevalence rates of overweight and obesity and associated NCDs such as CVDs. Other morbidity risk factors include hypertension and diabetes that require early detection and management. Asians face heart failure ten years earlier than Americans and Europeans. The control of CVDs is part of the global targets in the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 (resolution WHA66.10). The most cost-effective interventions to address CVDs identified by WHO include a set of population wide initiatives, such as reducing the risk of obesity by improving the nutritional quality of food systems and diets and a set of individual solutions that target high cardiovascular risk patients with multiple morbidities through primary care interventions and access to medicines.

SDGHI faculty are working throughout the region to improve the management and reduction of CVD risk factors such as hypertension and diabetes through clinical trials and research on innovative primary health models. If successful and cost effective, this work can be expanded to other countries and be instrumental in lowering death and disabilities in key demographic groups.

Expanding scope of work:

SDGHI faculty set up the Asian Sudden Cardiac Death in Heart Failure Registry, which regularly provides prospective data on the demographic, risk factors and outcomes of Asian patients being treated for Heart Failure (HF). This Registry is expected to advance fundamental understanding of Asian HF phenotypes and the burden and predictors of death and hospitalisation among these patients. Eleven Asian countries participate in the Registry, including Indonesia, Malaysia, the Philippines and Thailand. This Registry could potentially be implemented in other countries in the Mekong River region and expanded to undertake studies aimed at identifying groups that cannot access HF treatment.

5. Skills enhancement and training for allied health workers

According to the WHO report 'Rehabilitation 2030: A Call for Action', there is an ever-increasing unmet need for rehabilitation in many parts of the world. With ageing populations and the increased prevalence of NCDs and injuries, the importance of rehabilitation services demand greater attention. Improving the environment for rehabilitation in the region would allow those who were previously constrained by physical injuries and disabilities to be empowered to lead fuller and longer lives.

SDGHI faculty are working in several regional countries to develop sustainable physiotherapy programmes. The work is most advanced in Cambodia where SDGHI faculty helped develop a Bachelors of Physiotherapy Programme with University Health Sciences (UHS). SDGHI plans to adopt

the model of engagement in Cambodia to expand its collaborations with other partners across the region.

Implementing models of engagement:

Future collaborations with UHS in Cambodia aim at expanding the physiotherapy curriculum to include speech and occupational therapy as well as develop an inter-professional programme. This model of engagement is built to be sustainable over the long term as it integrates the enhanced educational curriculum into ongoing programmes while training local faculty to lead and implement the programmes.

While road injuries are amongst the top ten causes of mortality/disability in Laos and Vietnam, the availability of rehabilitation services is not regarded as one of the priorities in their healthcare systems. Currently, the Physiotherapy Education Upgrade Programme carried out in Laos is in its nascent stage and SDGHI aims to assist in the expansion of the training and research carried out in the area. Future expansion of such models of collaboration to Vietnam is also envisioned as part of SDGHI's goals to improve health outcomes in the region.

Goal 2: Increase health security

SDGHI's health security initiatives are focused on issues that are pertinent to pandemics and disease outbreaks. Singapore's geographic position and small size make it particularly vulnerable to such threats. Strengthening health security for the region is vital for the diminishment of such threats to Singapore. Considerations of proximity to Singapore make research and partnerships in the Southeast Asia region highly relevant to ensuring that these threats are addressed pre-emptively and systematically.

Southeast Asia remains vulnerable to many threats from various kinds of infectious diseases. The destruction of forestlands for agricultural expansion has caused the spread of zoonotic diseases and vector borne infections. Mega-trends such as urbanisation, climate change and globalisation have also contributed to these threats. Vector borne disease such as malaria and dengue fever remain a great burden. For example, WHO reported a sharp increase in the incidence of dengue fever in Cambodia, Laos, Malaysia, Philippines, Singapore, and Vietnam in 2019.

SDGHI will work with cross-sectoral partners to help build laboratory capacity, conduct disease surveillance, devise policies for outbreak response and preparedness activities and create collaborative disease prevention strategies to reduce illness and death in neighbouring countries. These efforts will be informed by the underlying rationale of increasing health security at the individual level (through better management of the environment-animal-human interface), the societal level (through preventive and outbreak containment strategies) and the global level (through macro and international level policies as well as increased understanding of the One Health chain). This work will create training and research opportunities as well as develop capabilities in partner institutes.

SDGHI faculty have deep expertise in virology. Our faculty work across the epidemic preparedness spectrum from detection, surveillance, development of novel diagnostic tests, prevention and control

of new and emerging pathogens, to product/vaccine development, to regulatory issues, policy harmonisation and health systems research.

1. *One Health*

The One Health initiative is a worldwide movement for expanding interdisciplinary collaborations and building understanding of the inter-connected aspects of health for humans, animals and the environment. Activities undertaken under the One Health umbrella include conducting biomedical research, expanding the scientific knowledge base, promoting public health efforts, improving medical education and enhancing clinical care as well as discerning environmental drivers of disease. In particular, the One Health approach plays a significant role in the prevention and control of zoonoses (infectious diseases caused by bacteria, viruses and parasites that spread between animals and humans) and vector borne diseases.

For SDGHI, employing the One Health lens will be a key strategy to strengthen health security. SDGHI's faculty are leading experts in the field of zoonotic diseases and implementing One Health projects across the region. Avian influenza (transmitted from birds) and SARS (originally transmitted from bats) are examples of zoonotic infectious diseases in which SDGHI faculty are international leaders. Ongoing One Health projects include small mammal surveillance initiatives in Cambodia and pathogen surveillance among pigs in Vietnam and Cambodia. SDGHI plans to build on these One Health initiatives.

Adopting multi-disciplinary approaches:

An important area of enquiry related to health security is food systems. Many major health problems are linked to the food system (e.g., antimicrobial resistance (AMR), One Health, NCDs, nutrition, infectious diseases, certain types of cancers, climate change). The management of food systems requires a more sustainable approach to mitigate the increased threats from infectious disease, climate change and pollution hazards. Two recent Lancet Commission papers showed that the syndemic of undernutrition, obesity, health, food systems and climate change are critical issues to be tackled particularly in fast growing economies (Swinburn et al., 2019; Willett et al., 2019).

SDGHI will explore ways to engage with relevant partners in this area through its global health lens, which can supplement the efforts of other institutions working in the food system. SDGHI faculty have expertise in many food related health concerns (e.g. One Health and infectious diseases, diet-related cancers and other NCDs), and accessing these multi-disciplinary expertise enables SDGHI to bring a well-rounded perspective on important health issues that interact with the food system.

2. Vaccines

SDGHI will focus on vaccine development and deployment as important cornerstones of health security. Effective vaccine deployment strategies are vital public health efforts that have large ripple effects on the health status of the populations in general and specific groups in particular. In the era of a strong anti-vaccination movement, key research on vaccine deployment and effectiveness is required to maintain the public health gains achieved over the last few decades.

Given its geographical position and its status as a major travel hub for the region, Singapore is highly vulnerable to the introduction of vaccine-preventable diseases and controlling their spread following any inevitable introduction is thus vital to safeguard the well-being of Singaporeans and the Singapore economy. As these threats emerge from both within and outside its borders, it would be prudent to address these before they occur. This entails working closely with the neighbouring countries through research, surveillance and prevention initiatives. Establishing the right partnerships is key to building the required foundations to address infectious disease challenges before they reach Singapore.

The partnership of EID and CoRE with the Coalition for Epidemic Preparedness Innovations (CEPI) and its Joint Coordinating Group to study Nipah vaccine development and converge regional regulatory requirements to expedite new vaccine approvals for “Disease X” offers opportunities for SDGHI to grow in this area.

Outbreak preparedness:

SDGHI faculty are working on developing vaccines to prevent and control epidemics such as the Nipah virus. Our faculty are focusing on both regulatory and scientific collaborations in the region to enhance Southeast Asia’s capability of responding to potential epidemics. Learning from the experiences of West Africa’s Ebola outbreak, it is important that Southeast Asian countries work on policy harmonisation, while also creating alliances to enhance the regulatory process for vaccine development and deployment during epidemics when time constraints are pressing.

An initiative to develop a regional network devoted to developing local diagnostic and research capabilities is currently being established with DGHI and Duke University. A well-established network of collaborators in the region can play a crucial facilitating role in times of crises.

Goal 3: Strengthen health systems

Health systems strengthening (HSS) is a recognised priority today across the health development field. It includes investing in inputs such as physical infrastructure and the health workforce and reconfiguring how the different parts of the system operate and interact to meet the needs of the populations they serve. A bedrock of HSS is the improvement of the primary healthcare infrastructure to increase access to, quality of and affordability for essential health services and technologies.

The focus on building primary healthcare as the main pathway to achieve cost effective healthcare delivery has re-gained traction in the international arena. The Astana Declaration in 2018 reinforced

the 40-year-old Alma-Ata Declaration's identification of primary health care as the key to attainment of health equity and universal health coverage. An effective primary healthcare system is able to deliver vital health interventions in an integrated manner. With the increase in NCDs, which require long-term care and management and the evolving demand for higher quality services, the primary care infrastructure bears the burden of being responsive to and the main point of access for vulnerable populations. This is particularly true in LMICs in the midst of providing care for the "double burden" of communicable and non-communicable diseases, while transitioning from external donor assistance to sustainable domestic funding.

As outlined below, SDGHI will conduct research projects in these areas.

1. *Innovative models of care*

As part of the efforts to support HSS in the region, SDGHI faculty are and will continue to contribute to the international agenda of developing innovative models of care. This will be done by applying a health services research approach based on a conceptual framework and methodologies that systematically account for the interests of consumers across socioeconomic groups and urban and rural landscapes, as well as the concerns of healthcare providers, government and external funders. These models of care will be rooted in the idea of ensuring access to the health system for neglected groups and underserved populations. Strategies to address gaps and deficiencies will be based on local concerns and account for realities in primary care settings. The methodology behind these strategies will enable systematic distillation of results and outputs that can be generalisable and applied to other similar contexts. This approach will enable scaling and adapting global health innovations that address critical needs in primary healthcare.

Current efforts aimed at strengthening primary healthcare facilities to better manage and control NCDs have the potential for national roll out if found feasible and practical. The lessons learned and methodologies employed can be utilised in other similar countries in the region, including Singapore. It is not uncommon that some of the best ideas and innovations are borne out of situations of greatest constraints.

2. *Access to Medicines*

Access to medicines has improved significantly in LMICs in Southeast Asia since the 1970s. Significant gaps remain, however, for the low-income segments of the populations. Traditionally, access to medicines initiatives have mainly focused on the supply side. However, lessons learned from efforts to tackle HIV/AIDS show that access to drugs is determined by a plethora of factors, including cultural aspects, poverty determinants, educational levels, service delivery capacity and competencies, policies, etc. In order to ensure real impact from improved access to medicines, a systems approach is required.

Furthermore, issues of quality and inappropriate use of drugs are also part of the access concerns in Southeast Asia. Sub-standard and falsified medicines, especially due to the large informal sector, and over prescription of antibiotics, are critical elements in the access to medicines narrative.

SDGHI will analyse efforts to improve access to medicines by utilising a framework that enables an examination of the various components of the health system and evaluates access to medicines issues from multiple perspectives. By broadening the approach, from solely considering the supply of medicines, which is just one aspect of the health system, SDGHI seeks to highlight issues related to the entire spectrum across the delivery of healthcare. This methodology can be utilised to find and scale the best solutions that fit local needs and incorporate considerations of how best to ensure access to quality healthcare for marginalised groups and vulnerable populations. Such efforts will be undertaken in conjunction with key stakeholders including pharmaceutical companies, Ministries of Health, other healthcare providers and patient and community representatives. A systematic evaluation of the gaps and barriers in healthcare systems will provide guidance on how access programmes can be improved with context specific recommendations that take a systems approach.

IV. Requirements

Faculty Recruitment

None of the current SDGHI faculty leadership dedicate more than 20% of their time to the Institute except for the SDGHI Director. Moreover, few of the SDGHI appointed faculty dedicate more than 50% of their time to projects outside Singapore. The Institute also lacks generalists with broad knowledge in global health, necessary for teaching and mentoring. Accordingly, as one of its top priorities, the Institute would like to recruit five global health faculty over the next three years. These additional faculty, who will likely be jointly recruited and affiliated with an SRP, ACP or another AMC Institute, will enhance SDGHI's faculty roster in high priority areas such as those described in Section III above. At least one-third of these faculty members will be appointed at the Associate Professor/Professor rank. All of them would spend up to 75% of their time in undertaking research abroad and on Institute related academic and administrative matters.

One means of recruiting new, junior global health faculty will be through the Global Health Fellowship Programme described in Section II. Graduates of this Programme will have particular expertise in an important area of global health and overseas experience in research gathered through their MPH degree. Efforts will be made to find a suitable academic home for them after they obtain their degree.

In addition, as described in Section II, faculty across the AMC will be offered the opportunity to enhance their knowledge in global health and their ability to teach and work in global health settings through organisation of short courses and workshops and faculty development activities specific to global health. This is another way of augmenting the expertise of SDGHI faculty.

Financial Resources

When SDGHI was launched in January 2019, it received funds from the Khoo Teck Puat Foundation for the period 2019-2021 to support its activities. A distinct advantage of the Foundation funds is that they can be used to support activities outside Singapore, which is vital for the work of a global health institute. We now have the benefit of a year of operation behind us and a clearer understanding of

the Institute's financial needs. We recognise that additional funds are particularly required to support the recruitment of new faculty as described above. More funds are also required to support operating expenses related to the foundational work of building capacities, initiating new research collaborations, developing policy initiatives and supporting educational programmes. These funds will need to be obtained primarily through external resources, given the limitations placed on use of Government of Singapore funds. We will make maximum efforts to seek such funds from international donors and work closely with the SingHealth and Duke-NUS Development Offices to identify potential donors in Singapore and in the region. Additionally, we will augment our fundraising efforts with revenue generating initiatives like the Certificate Programme and stackable education modules.

Communications Strategy

SDGHI will utilise a broad range of communication tools and strategies to engage in global health policy dialogues, advocate for important health topics and solutions in Southeast Asia and gain recognition for SDGHI as key global thought leader in global health. This will include an active social media voice, encouragement of faculty blogs, media engagement to gain press coverage and student stories to highlight the significance of SDGHI's important work to a broader audience. Public outreach efforts will include publicising our global health seminar series and widely disseminating important SDGHI academic publications and initiatives. Internal communications will also be supported through knowledge management strategies that will help enable the development of multidisciplinary collaborations within our institution.

Administrative and Logistical Support

SDGHI will provide administrative and logistical support as appropriate to facilitate the varied global health research, capacity building, policy and education activities undertaken by SDGHI faculty. Key dimensions of such support include navigating legal and administrative procedures for establishing collaborations between institutions in the AMC and partner institutions locally and internationally; assisting with obtaining required ethics approvals; overseeing grant applications and grant administration for regional projects; and providing operational support related to human resources, finance and other infrastructure needs for projects undertaken outside Singapore. SDGHI will also provide risk management and travel safety advice. SDGHI staff will guide international data management and data transfer protocols. Similarly, support for transfer of biological samples and other materials will be provided.

In addition to this wide array of administrative support, SDGHI will serve as a resource for information on available funding opportunities for regional projects from organisations within and outside Singapore.

V. A Final Thought

As we note at the beginning of the plan, Singapore has an important role to play in the field of global health and will benefit from deepening its expertise in both research and educational capabilities and strengthening its own health and the health security of the region. Along with NUS and NTU, we plan

to engage the public and private sectors in the country to be sure they appreciate this role and mobilise their support towards our efforts. In the public sector, we plan to engage with the Ministries of Foreign Affairs, Health and Education, the National Medical Research Council and the National Research Foundation. In the private sector, we will engage with the thriving biomedical sector and enlist them as partners in our efforts. Support from these entities will be vital to the eventual success of the Institute.

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