TRUST

IMPROVING HEALTH OUTCOMES THROUGH TRUSTED DATA EXCHANGE

TRUST Data Access Committee

Annual Report FY2024

Introduction to TRUST

TRUST (Trusted Research and Real world-data Utilisation and Sharing Tech) is a national health-related data governance framework and analytics platform that catalyses health data research and innovation to improve health.

The platform facilitates safe, expeditious and secure data sharing, linkage and analysis of health-related research and real-world/administrative data between public institutions and non-government entities.

It enables researchers to expedite scientific discoveries, improve understanding of diseases, develop more precise predictions and accurate treatments, plan holistic health well-being programmes, and evaluate public health policies.

TRUST aims to address key data challenges currently faced by researchers. These challenges include limited access to data due to lengthy negotiations between data sources, varied data standards that hinder data linkage and analytics, and the absence of a secure platform and trusted third party to enable data access and linkage.

Jointly developed by

MINISTRY OF HEALTH SINGAPORE

MINISTRY OF DIGITAL DEVELOPMENT AND INFORMATION

GOVTECH SINGAPORE

synapxe

TRUST Research Partners

Agency for Science, Technology and Research SINGAPORE

CRIS

DukeNUS Medical School

MOHT MOH OFFICE FOR HEALTHCARE TRANSFORMATION

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NHG Health

NUHS National University Health System

NUS National University of Singapore

SIT SINGAPORE INSTITUTE OF TECHNOLOGY

(SEC) SINGAPORE-ETH CENTRE

SMU SINGAPORE MANAGEMENT UNIVERSITY

SUSS SINGAPORE UNIVERSITY OF SOCIAL SCIENCES

SingHealth

To Our TRUST Stakeholders and Partners

Philip Ong
Deputy Secretary (Development),
Ministry of Health
Chair, TRUST Data Access Committee

I am pleased to present the FY2024 Annual Report of the Trusted Research and Real world-data Utilisation and Sharing Tech (TRUST) Data Access Committee (DAC). What began as an ambitious vision for a national health-socio economic research platform is maturing into a reliable and impactful research enabler.

By facilitating secure access to real-world anonymised data, we have enabled researchers to generate valuable insights that inform and shape healthcare policies and outcomes for Singaporeans.

In FY 2024, researchers could access more than 45 anonymised datasets through TRUST, including government administrative data, national registries, and national lifestyle programme data. TRUST also supported 33 approved data requests during FY 2024, more than doubling our reach and impact compared to last year.

In the past year we added four new research partners, bringing us to a total of 13 public research organisations (PROs) as TRUST Partners, with discussions ongoing with several more organisations. Our framework supporting industry access to TRUST will soon enable valuable collaborations between academia and the private sector, advancing healthcare innovation in Singapore.

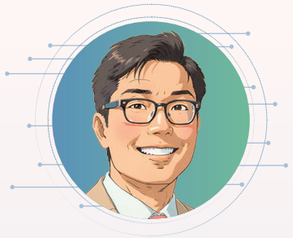
The members of the TRUST DAC continue to play an integral role in our progress. Their voluntary service and dedication to ensuring responsible data access have been instrumental in maintaining high standards of data governance while facilitating valuable research.

The TRUST DAC Secretariat remains a cornerstone of our operations, through their efficient and professional assessment of data access requests and ensuring adherence to the highest standards of data security and integrity.

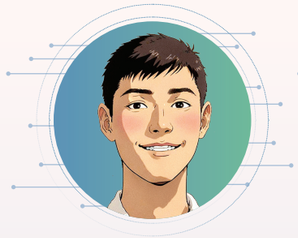
This report demonstrates how far TRUST has come since our full operationalisation in November 2022. The foundation laid by colleagues at the Ministry of Health (MOH), the Government Technology Agency (GovTech), the Ministry of Digital Development and Information (MDDI) and Synapxe continues to support our growth and evolution.

To all our partners and stakeholders – researchers, data contributors, administrators, and members of the public – thank you for your continued support of TRUST and its mission to advance healthcare research for the benefit of Singapore and Singaporeans.

Data Access Committee (DAC)

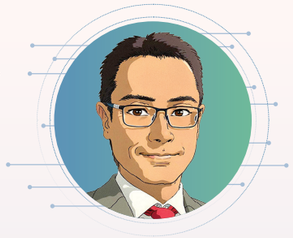


Mr Philip Ong
Deputy Secretary (Development)
Ministry of Health (MOH)

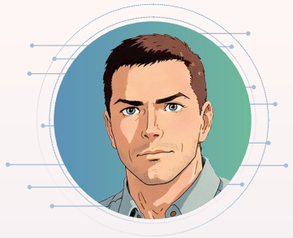


Mr Lai Kai Bin
Deputy Director
Smart Nation and Digital Government Group
Ministry of Digital Development and Information (MDDI)

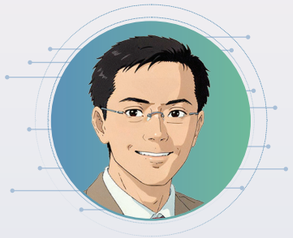
Ms Lim Yi Ding
Director
Trusted Centre for Individual and Business Data
Department of Statistics (DOS)



Professor Yeo Khung Keong
CEO
National Heart Centre Singapore (NHCS)
Singapore Health Services (SingHealth)

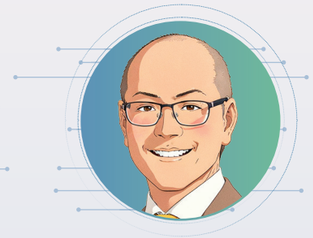


Professor Julian Savulescu
Director
Centre for Biomedical Ethics
National University of Singapore (NUS)



Associate Professor Ngiam Kee Yuan
Group Chief Technology Officer
National University Health System (NUH)

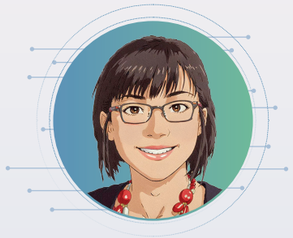
Associate Professor Tan Cher Heng
Group Chief Research Officer
National Healthcare Group (NHG)



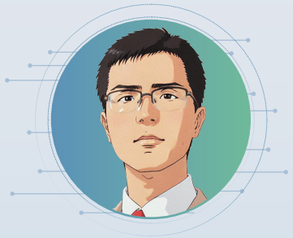
Professor Chng Wee Joo
Vice President
Biomedical Science Research
National University of Singapore (NUS)

Professor Roger Vaughan
Director
Centre for Quantitative Medicine (CQM) and Centre for Clinician-Scientist+ Development (CCS+D)
Duke-NUS

(until 15 January 2025)

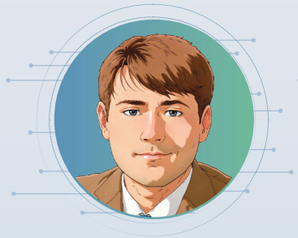


Ms Ai Ling Sim-Devadas
Deputy Director (Advocacy & Engagement)
Lee Kong Chian School of Medicine
Nanyang Technological University (NTU)

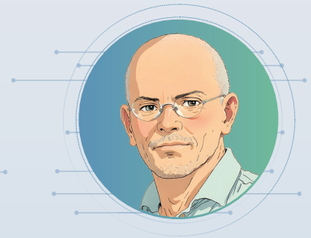


Associate Professor Liu Nan
Director
Duke-NUS AI Medical Services Initiative (DAISI)
Duke-NUS

(from 16 January 2025)

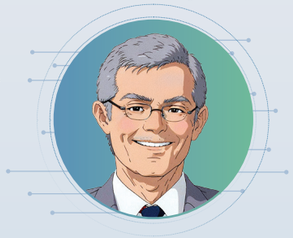


Dr Sebastian Maurer-Stroh
Executive Director
BII
Agency for Science, Technology and Research (A*STAR)

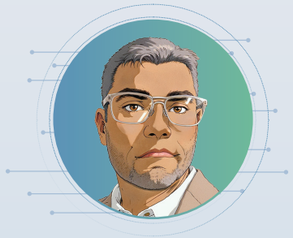


Professor John Chambers
Chief Scientfic Officer
PRECISE
Consortium for Clinical Research and Innovation, Singapore (CRIS)

Professor, Cardiovascular Epidemiology, Lee Kong Chian School of Medicine
Nanyang Technological University (NTU)



Professor Simon Chesterman
Vice Provost
Educational Innovation
National University of Singapore (NUS)

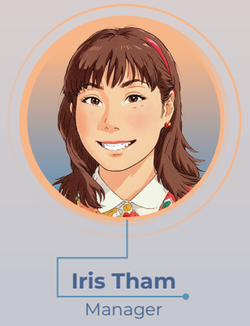


Mr Rajakanth Raman
Executive Director
Rainbow Across Borders

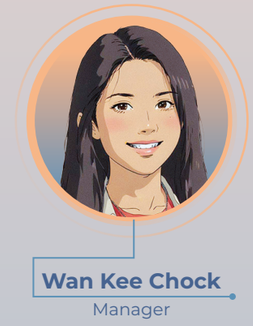
Data Management Division - Data Concierge

Yu Li Ng
Assistant Director

Wen Jun Cheong
Manager



Iris Tham
Manager



Wan Kee Chock
Manager

Shuangyi Fan
Manager

Ee Lin Chan
Manager

TRUST Data Access Committee (DAC)

The TRUST DAC was set up to enable expeditious access to data to support research and innovation while upholding data governance according to the pre-agreements between TRUST and the Data Contributors. The TRUST DAC has thus been delegated the authority to approve data access on behalf of the Data Contributors and serves to ensure that the right balance is maintained between advancing public interest through health innovations that contribute to better health outcomes while protecting individuals' privacy and confidentiality.

TRUST DAC is made up of the following:

- Business Owner (Chair): MOH
- Government Data Representatives: SNDGO, Department of Statistics
- Performers/Institutional Representatives: Agency for Science, Technology and Research (A*STAR), Consortium for Clinical Research and Innovation, Singapore (CRIS), Duke-NUS Medical School, Nanyang Technological University (NTU), National Healthcare Group (NHG), National University Health System (NUHS), National University of Singapore (NUS), Singapore Health Services (SingHealth)
- Non-institutional Representatives: Ethics, Legal, Lay-person

We were delighted to welcome our new members to the committee this year: Associate Professor Tan Cher Heng representing the National Healthcare Group, Associate Professor Liu Nan from Duke-NUS Medical School, and our lay representatives, Mr Rajakanth Raman and Ms Ai Ling Sim-Devadas. Moving forward, TRUST aims to include increased lay and public representation on the DAC, as part of efforts to increase public participation and engagement for the platform.

Note: There is flexibility for TRUST DAC to include other domain experts in areas not already covered by the above representatives when required.

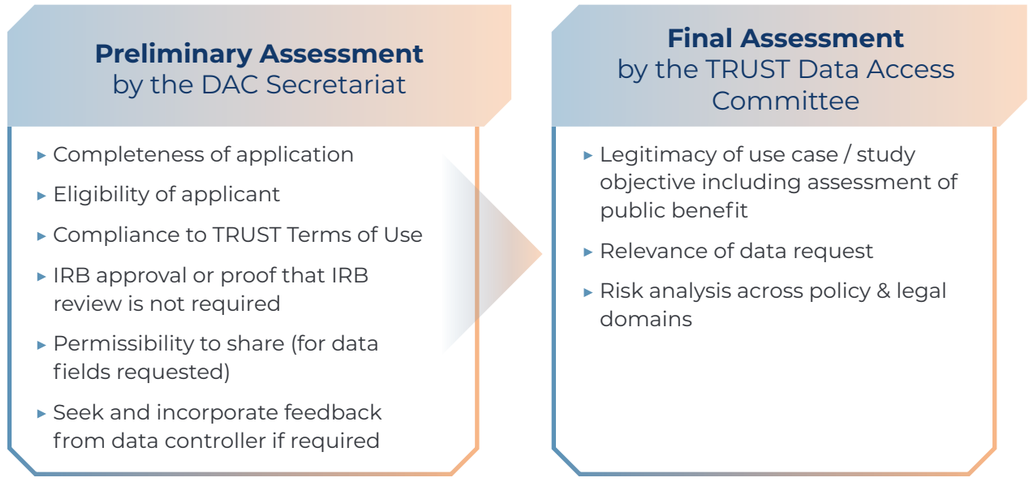
TRUST Data Request (TDR) Review Process

Complete data requests received by the last Friday of each month will be assessed and reviewed by TRUST DAC within four to six weeks. TRUST DAC meets once a month to review data requests, except for the month of December.

Each data request will undergo two stages of assessment (Figure 1). At the first stage, DAC Secretariat will conduct a preliminary review to ensure that the documentation is complete and all necessary information in the TDR form (e.g. justification for data requested) have been provided. At the second stage, TRUST DAC will ensure the legitimacy of the research and relevance of the data requested by reviewing the scientific, clinical, and health value of the data request. TRUST DAC will also ensure that the purpose of use fulfils public interest and is assessed to be of social value and evaluate the risk benefit of the data requested. TRUST DAC may also request for more information from the Data Requestor before making the final decision on the data request. TRUST DAC's decision is final.

Note that for Sensitive Health Information (SHI), rare diseases and data deemed as sensitive by respective data custodian, additional approval is required and the time to approval would take minimally six to eight weeks.

Figure 1: Two Stages of Assessment for TDRs



Following TRUST DAC's approval, data is provisioned to the approved users six to ten weeks post-approval (on average). The total time for provisioning could differ depending on complexity of data requested.

DAC Review Statistics at a Glance

TRUST commenced operations in November 2022 and as of March 2025, we have received a total of 90 data requests, and 54 were approved, with 23 in preliminary assessment phase (Table 1). We have also supported four collaborative projects that do not require TRUST data but tap on TRUST only as a technical platform.

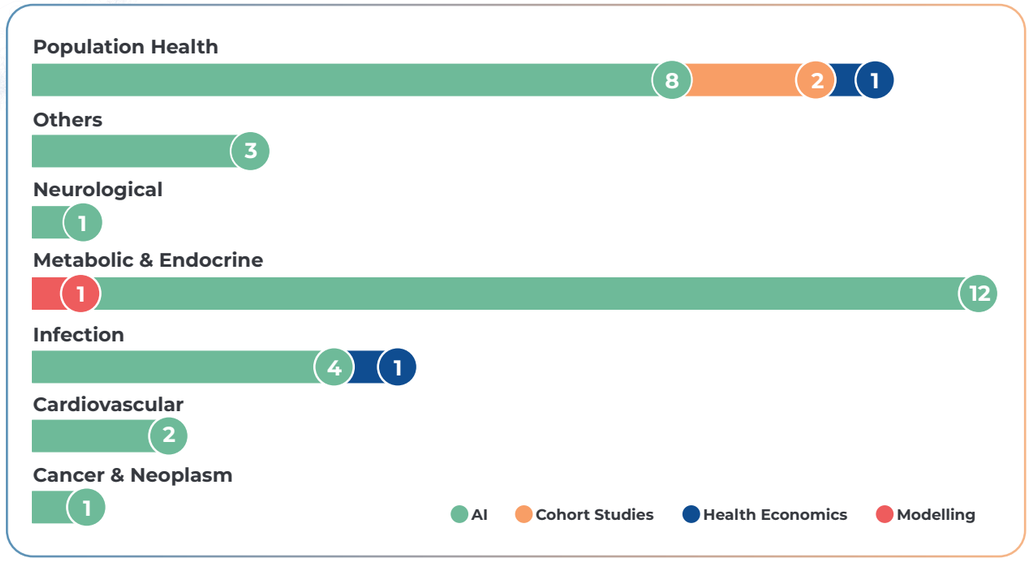
Table 1: TRUST Data Request Statistics (November 2022 to March 2025)

Total no. of TDRs received (since inception) (a) + (b) + (c) + (d) +(e)	**90**
Total TDRs approved (a) + (b)	
(a) No. of Requests (within scope of HHP domain#) approved by DAC / DAC Chair / SSOT	54
(b) No. of Requests (beyond scope of HHP domain#) approved by DAC Chair / SSOT	4
Total TDRs not approved or closed (c) + (d)	
(c) No. of requests not approved	3
(d) No. of requests closed by DAC Secretariat*	6
(e) No. of requests in preliminary assessment phase by DAC Secretariat^ (pending information to proceed)	**23**

 # RIE2025 Health and Human Potential domain mainly covers viz (i) Cancer and neoplasms, (ii) Cardiovascular, (iii) Metabolic and endocrine, (iv) Mental health, (v) Infection, (vi) Neurological and (vii) Eye and population health.
^ Requests under this category are pending Data Requestors' response to DAC Secretariat queries, clarification and advice to improve the data request.
** Refers to TDR submissions where the requestor did not reply to DAC Secretariat or provide additional information / clarification when requested, and the request was subsequently closed.*

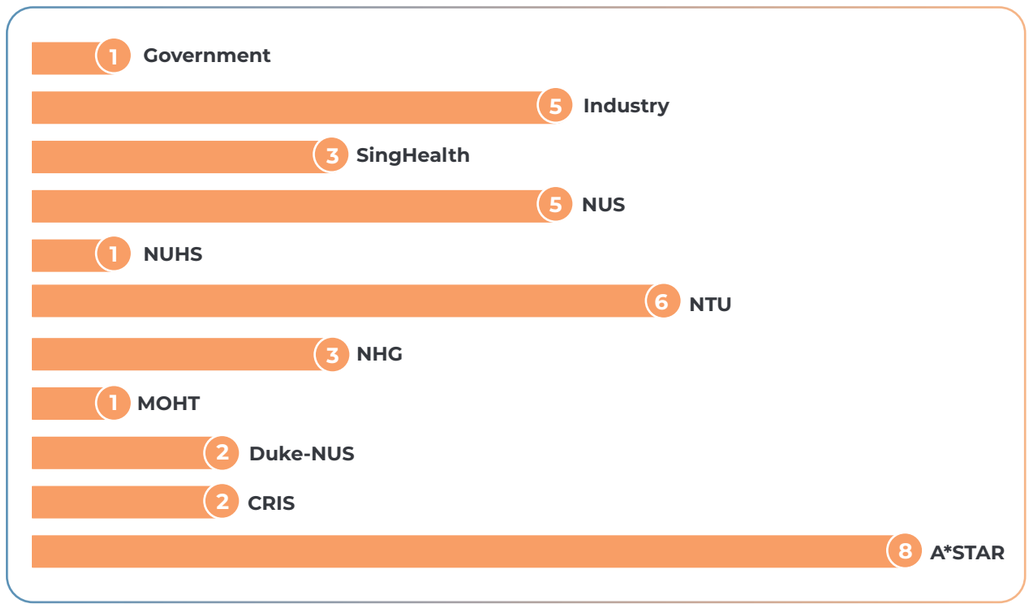
Specifically 33 TDRs within the scope of Health and Human Potential (HHP) domain were approved in FY2024. Cohort studies on population health formed the majority and use cases from A*STAR formed the largest proportion of these approved requests.

Figure 2: TRUST Use Cases by Disease Areas & Types of Analytics (FY2024)



- **Artificial Intelligence (AI)** – Data projects that aims to develop AI algorithms and models to facilitate/improve health management and care delivery.
- **Health Economics** – Studies that examine the economic burden and of disease of illnesses for individuals, households, and societies. Also includes cost-effectiveness studies.
- **Cohort Studies** – Longitudinal studies to examine the individual's healthcare journey, particularly healthcare utilisation and health outcomes. Includes both healthy and disease populations.
- **Modelling** – Studies which tap on existing data as parameters to create models of predictive or analytical value.

Figure 3: TRUST Use Cases by Organisations (FY2024)



Commonly Requested Datasets

The top 10 data domains requested by TDRs approved in FY24 are as follows.

Research Outcomes / Publications

Many of these projects are reaching completion, and the corresponding publications and selected project summaries represent the diverse application of TRUST data. TRUST is proud to showcase these contributions to the field of health-social research.

Click to go to links

Paper	Publication	Year	Project	Main Applicant(s)
The Health for Life in Singapore (HELIOS) Study: delivering Precision Medicine research for Asian populations		2024	Linkage of HELIOS data for Technical Evaluation and Training	Professor John Chambers, Precision Health Research, Singapore (PRECISE, CRIS)
Comparison of contact tracing Methods: A modelling study	*Infectious Disease Modelling*	2025	Infectious Disease Modelling and Analytics in the Post-Pandemic Era	A/Prof Alex Cook, Swee Hock School of Public Health (SSHSPH, NUS)
Trends in cancer incidence in Singapore over the last two decades	*Journal of Clinical Oncology*	2025	National Health Economics on Cancer	Dr Kennedy Ng Yao Yi and Dr Iain Tan, National Cancer Centre Singapore (NCCS)

Use Case: Contact Tracing Study Sets Benchmark for Future Preparedness

A comprehensive study supported by TRUST has provided valuable insights into the effectiveness of different contact tracing methodologies. A joint research team from the Centre for Epidemic Research and Modelling (CERM) at the Saw Swee Hock School of Public Health, National University of Singapore and the National Centre for Infectious Diseases (NCID), leveraged TRUST's secure data-sharing capabilities to analyse and compare various contact tracing approaches.

The team developed sophisticated simulation models to evaluate contact tracing methods across different scenarios, addressing the varied implementation of strategies observed globally during the pandemic. Their analysis encompassed key components, including case detection, isolation protocols, contact identification, and quarantine requirements.

The findings demonstrated that contact tracing achieves optimal effectiveness when implemented with high case-ascertainment rates and contact quarantine measures. Under these conditions, disease transmission can be halted early, making tracing operations more manageable and cost-effective.

The study's methodology was strengthened by TRUST's secure infrastructure, enabling direct analysis of parameter estimates from contact tracing data. This integration of real-world data enhanced the precision of simulation models executed under high-performance computing systems.

The research findings are expected to contribute significantly to Singapore's emergency preparedness planning, particularly in developing adaptive contact tracing strategies for future public health challenges. Through secure data sharing and analysis capabilities, this collaborative research advances our understanding of effective public health responses.

Use Case: Study Reveals Economic Burden of COPD in Singapore's Healthcare System

A groundbreaking study led by a research team at the Saw Swee Hock School of Public Health at the National University of Singapore, using health administrative data on TRUST, has uncovered significant economic implications of Chronic Obstructive Pulmonary Disease (COPD) and its associated conditions. Using data spanning 2012 to 2019, the research team compared 18,866 COPD patients with matched non-COPD individuals using the TRUST platform.

The findings reveal that COPD patients incur healthcare costs five times higher than their non-COPD counterparts, averaging S$5,290.90 per patient-year. COPD-related expenses account for 33.8% of total costs, with cardiovascular and non-COPD respiratory diseases each contributing 14.9%. Hospitalisation emerged as the primary cost driver, representing 70.1% of total expenses. The study also found distinct cost composition patterns unique to Asian phenotypes when compared to Western populations.

Demographic analysis showed that males aged 65 and above faced the highest healthcare costs, averaging S$5,658.80 per patient-year. The study identified that high-cost patients, comprising the top 10% of healthcare users, incurred these costs primarily through recurrent hospitalisation.

The findings highlight the urgent need for improved COPD management strategies and suggest that effective handling of COPD-related comorbidities could significantly reduce the economic burden on Singapore's healthcare system. This could include better coordination among care providers to enable earlier-stage diagnosis and further investigation into Asian populations to develop Asian-specific strategies. The study's comprehensive approach using long-term healthcare data provides valuable insights into future healthcare planning and resource allocation.

Progress and Plans

As part of ongoing internal review and based on feedback from our regular user surveys, TRUST completed several initiatives to improve operational efficiency and provide better support to researchers, including:

- Streamlining the approval processes to reduce lead time for the import of codes and non-individual level data. The request form was also centralised and digitalised to reduce manual exchanges and handling.

- Improved the export process for research project analytical output, using an online form to guide users and reduce occurrences of incorrectly filled fields. The export guidelines for users was also improved, with the goal of reducing the number of re-submissions.

Other improvements are in the pipeline and will be progressively rolled out in the coming months. These include:

- The introduction of Data Companion, a centralised interactive interface for TRUST users containing our data dictionaries and code tables.

- Introduction of a comprehensive data reference guide that helps researchers quickly navigate and understand the key differences between our available datasets.

- Creation of shared community resources such as analytics methodology and processed datasets. Such resources will be created in collaboration with researchers and be made available to all TRUST Users.

- Introduction of automated compliance checks for data exports, to improve turnaround time for Users while maintaining the rigour of current export checks.

Moving forward TRUST will continue to work with users to ideate and implement platform improvements to better enable research work, be it through the introduction of new tools, deployment of additional streamlined or self-help services, or use of AI / automation to reduce turnaround times.

Annex A

Specifically, DAC approved 37 TDRs in FY2024 and they are summarised below. Please refer to TRUST website (under Approved Research Projects) for the abstracts of the approved TRUST data requests.

SN	Approval Date	Title	Applicant
1	4 Jul 24	Examining factors influencing COVID-19 vaccine adoption through multivariate, time-series and multi-country analysis	Dr Chitra Panchapakesan Kumari
2	13 Jun 24	Population-based Observational Study on the Utilisation of Acute Hospital Beds Among Singapore Residents & Study the Utilisation of Hospital-at-home (HaH) Services and Predicting Virtual Bed Capacity to Serve Singapore Residents	Dr Lim Hoon Chin
3	8 Jul 24	Generation of health and healthcare utilisation data, and work-related statistics from Precision Medicine intervention cohorts to generate evidence and demonstrate the value of Precision Medicine to stakeholders and inform policymaking	Prof David Bruce Matchar
4	29 Jul 24	Studying the short and long-term impact of climate and climate change on infectious and chronic diseases	Dr Lim Jue Tao
5	30 Aug 24	Demographics, co-morbidities, medications, healthcare service utilisation, health outcomes and healthcare cost of patients with respiratory diseases seen in the primary care	Dr Mabel Leow Qi He
6	3 Sep 24	Genomics Risk Factors in COVID-19 Pandemic	A/Prof Barnaby Young
7	27 Sep 24	Understanding the relationship between health behaviours, health risks and healthcare expenditures	Asst Prof Cynthia Chen Huijun
8	6 Nov 24	Unravelling the Determinants of Kidney Health in a Multi-Ethnic Asian Population	Dr Yeo See Cheng

SN	Approval Date	Title	Applicant
9	14 Nov 24	Impact of National Service on BMI trajectory, comparison of male and female cohort	Dr Joachim Yau
10	27 Nov 24	Validation of the updated PRECISE-DAPT cancer score in an Asian population cohort	Dr Tan Sock Hwee
11	27 Nov 24	Understanding the incidence, outcomes and impact of COVID and other Communicable Diseases and COVID control measures amongst children and other mothers	Dr Dennis Wang
12	16 Dec 24	Identification of Asian-specific genetic association with fat and lean muscle mass distribution	Asst Prof Liu Boxiang
13	16 Dec 24	The SG100K_Med Alliance - Clinical Genetics Researchers United for the Analysis of Mendelian Disease Variation in SG100K	Asst Prof Lim Weng Khong
14	16 Dec 24	An integrated pharmacoeconomic-pharmacokinetic framework for prioritising and testing clinically important drug-gene interactions	Dr Janice Goh Jia Ni
15	16 Dec 24	The high variability of tandem repeats offers insights into population diversity and may explain the missing heritability of complex neurological and neurocognitive disorders in Asian populations	Prof Liu Jian Jun
16	20 Dec 24	The Singapore National Precision Medicine Programme Industry Collaboration [PRECISE PCC]	Prof John Chambers
17	20 Dec 24	Precision medicine approach for accelerating disease progression assessment and uncovering the genetic architecture of fibrosis	Dr Ding Zhihao
18	20 Dec 24	Target Discovery for T2D	Dr Maja KirkeGaard Jensen/Dr Ciara Vanjeli
19	20 Dec 24	Identification of patient segments in three indications of interest and assessment of their medical need and candidate interventions for addressing this need	Dr Jörg Lippert
20	20 Dec 24	Target and Biomarket Discovery for CKD	Dr Anil Karihaloo
21	22 Jan 25	Evaluating the Promise and Perils of Glucagon-Like Peptide-1 (GLP-1) Receptor Agonist: A Deep Dive into Therapeutic Potentials and Adverse Effects	Dr Huang Jian
22	22 Jan 25	Computation of genome-wide LD scores and matrices from the SG100K resource	Dr Li Jingmei
23	22 Jan 25	Unravelling the correlation between sarcopenia with lifestyle, genetics and comorbid diseases	Prof Teh Bin Tean
24	22 Jan 25	Impact of diet-related metabolic variation on incident cardiometabolic disease outcomes	Prof John Chambers
25	22 Jan 25	Genome-wide association study and population-based evaluation of patients with diabetic foot ulcers	Dr Lo Zhiwen Joseph
26	22 Jan 25	Modulation of Cholesterol 7α-Hydroxylase (CYP7A1) Activity as an Orthogonal Approach to the Management of Hypercholesterolemia	A/Prof Ho Han Kiat
27	22 Jan 25	Understanding the incidence, health service utilisation and costs of Cardiovascular Disease (CVD) for advancing health systems and improving CVD outcome	A/Prof Muhandiramalage Sanjeewa Madura Kularatna
28	22 Jan 25	Genetics of Allergic Diseases and Acne Vulgaris in the Singapore Population: Validation and Functional Characterization of Candidates	A/Prof Chew Fook Tim
29	22 Jan 25	Singapore Undiagnosed Disease Program	A/Prof Saumya Shekhar Jamuar
30	22 Jan 25	Impact of Infections (eg. COVID-19) on Cancer Outcomes, Care and Treatment, and Vaccine Efficacy in Cancer Patients	Dr Lee Xinwei Matilda
31	28 Feb 25	Portability of catalogued polygenic risk scores across ancestrally diverse Singaporean populations	Dr Pierre-Alexis Goy
32	28 Feb 25	Genetic Susceptibility of Age-related Hearing Loss	Prof Liu Jian Jun
33	28 Feb 25	Advancing Asian-Centric Liver Disease Treatment: Machine Learning Applications in MASLD and MetALD Precision Medicine	Asst Prof Tan Nguan Soon
34	28 Feb 25	Use of TRUST Administrative data to study predictors, incidence and burden of respiratory disease	Prof Sanjay H. Chotirmall
35	28 Feb 25	The contribution of genetics to dietary habit and its relation to adiposity and cardiometabolic diseases in multiethnic Asian population	Dr Theresia Mina
36	17 Mar 25	Disease and healthcare costs decomposition	Asst Prof Cynthia Chen Huijun
37	17 Mar 25	Characterizing genetic associations in the Singapore population to develop RNAi therapeutics	Dr Luke Ward