CAMS&PUMC Fuwai Hospital MSc Global Health Training Program Brochure

Overview

The Master of Science (MSc) in Global Health is a two-year, full-time, fully-funded course that provides comprehensive training in large-scale epidemiology, data science, and health economics and policy research to enable students to design, conduct, and interpret research in important areas of population health.

The MSc degree, the first of its kind in China, equips students with the breadth of knowledge, subject-specific expertise, specialized skills, and powerful global network necessary for a successful career in population health. The flexible degree format and array of options for specific fields of study provide a strong foundation in the core discipline of global health, as well as a specialized focus on developing scientific leadership skills to conduct work that will ultimately make a difference in people’s lives.

Who We Are

The Chinese Academy of Medical Sciences & Peking Union Medical College (CAMS & PUMC) has been a leader in modern medicine in China for more than a century. Known for its world-class contributions to medical research and education, CAMS & PUMC is dedicated to promoting international cooperation, and shares its vision and knowledge with collaborators worldwide through scientific exchange and the joint training of young scientists and graduate students.

Fuwai Hospital, which is affiliated with CAMS & PUMC, is a premier national hospital specializing in cardiovascular diseases. It includes the world's largest cardiovascular center — the National Center for Cardiovascular Diseases — that is a national resource and leader in the areas of clinical practice, medical research, disease prevention, and medical education.

Why Choose Us?

Students enrolled in the MSc in Global Health program will enjoy the following benefits:
• **A unique learning community**

Learn as part of a diverse, international student community of talented individuals in a training program designed to serve as an international cooperation platform aligned with the goals of China’s national strategy.

• **Outstanding curriculum taught by policy leaders in China and other experts**

To develop a deeper understanding of both science and China’s policy, learn from esteemed healthcare researchers, policy makers, and industry innovators from ministries of the Chinese government, leading universities, institutions, and enterprises, including the National Health Commission, National Development and Reform Commission, Ministry of Science and Technology, World Health Organization, United States National Institutes of Health, CAMS & PUMC, Peking University, Harvard University, University of Oxford and deCODE genetics, in lecture and seminar formats (refer to Teaching Board and Course Structure for details).

• **Exceptional research training opportunities tailored to your personal preference**

Expand your skillset through a full-year (2nd and 3rd semesters of the degree program) of experiences with our nationwide research teams, investigating a variety of practice-oriented topics within a collaborative network with representation from the government, thousands of health care institutions, academia, and other organizations.

Join any of these influential large-scale clinical and populational research initiatives according to your preference and capability. Focus areas include clinical trials, healthcare quality assessment and improvement, mega population cohort and biobank, health policy and system research, big data and artificial intelligence, and advanced data analysis (refer to Research Practice for details).

• **Immersion in Chinese culture**

Get to know the real China while making lasting memories. Experience China’s extraordinary cuisine, arts and literature, local festivals, museums, ancient wonders, and of course, the warm and welcoming Chinese people.

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**Who Is the Course Designed for?**

The MSc in Global Health is designed for students from a variety of academic and professional backgrounds who seek training for a career in global health. Each year we admit 50 talented, motivated, and collaborative students from Belt and Road initiative countries with backgrounds disciplines including medicine, biomedical and other sciences. Individuals in our diverse student population are dedicated to obtaining the skills that will enable them to translate knowledge into effective health
interventions, and share the common belief that population health research transcends national boundaries.

We welcome applications from individuals at various stages of professional development, from college graduates just beginning immersion in their field, to experienced health care professionals, to researchers who intend to pursue a career in global health.

Career Perspective

Through its extensive practical curriculum, the MSc degree aims to provide students with the knowledge and skills that will enable them to establish a successful career in academia, major national and international health organizations, government agencies, or in the corporate health care environment. Graduates will be equipped to:

- Have rewarding careers in consulting, research, hospital administration and policy making
- Lead departments at hospitals and health care agencies
- Become leaders of ministries of health, humanitarian organizations, corporations, academic institutions, and government agencies

About the Course: MSc in Global Health

Whether you are a medical doctor, an established public health professional, or new to the field of public health, the curricular options detailed below provide an exceptional foundation in the core discipline of global health, with a specialized focus to meet your individual goals.

Course Structure: Intellectual Breadth + Career Specialization

The innovative 2-year MSc curriculum — the culmination of a multi-year planning process at the CAMS & PUMC — is designed to create a pathway to practice-oriented professional careers. The new curriculum aims to instill “T-shaped” competencies, providing deep knowledge in an area of specialty (the vertical bar of the “T”) coupled with the breadth of knowledge (top horizontal bar) needed to work effectively across many disciplines and fields of inquiry.

The curriculum comprises four major forms of teaching:
• **Five compulsory modules of varying length and intensity (1st semester)**
  1) Large-Scale Epidemiology (3 credits, 54 class hours)
  2) Data Science in Healthcare Application (2 credits, 36 class hours)
  3) Implementation Science (2 credits, 36 class hours)
  4) Outcome Research (2 credits, 36 class hours)
  5) Health Economics and Policy Research (2 credits, 36 class hours)

• **Seminars and Global/National Conference Meetings**

• **Field Work and Case Study (2nd and 3rd semesters)**
  Apply what you have learned in our diversified projects:
  1) Large-scale Clinical Trials
  2) Healthcare Quality Assessment and Improvement
  3) Mega Population Cohort and Biobank
  4) Health Policy and System Research
  5) Health Big Data and Artificial Intelligence
  (See *Strength in Research Practice* for further detail)

• **Writing Scientific Articles (4th semester)**

**LARGE-SCALE EPIDEMIOLOGY** - designed to reduce the quantitative uncertainties about known vascular risk factors and to identify new causative risk factors; large multi-center clinical trials that verify the efficacy and safety of new drugs and innovative tools.

**CORE COMPETENCIES**

• Describe the role of epidemiology as a quantitative approach to address problems in public health and clinical medicine.

• Apply the basic principles and methods of large-scale epidemiology.

• Interpret epidemiologic results using appropriate analysis methods and tools.

• Develop a foundation for designing and managing a valid and efficient large-scale clinical trial or epidemiologic population study.

• Understand global trends in large-scale epidemiology studies and biobanks

**SESSIONS**

1. Fundamentals of Epidemiology
2. Classic Epidemiologic Methods I
3. Classic Epidemiologic Methods II
4. Population Epidemiology: Core Principles of Study Design and Implementation
5. Clinical Epidemiology: Core Principles of Study Design and Implementation
6. Clinical Epidemiology: Diagnostic, Prognostic and Intervention Research
7. Large Longitudinal Healthcare Databases
8. Advanced Analysis: Longitudinal Data
9. Advanced Analysis: Multi-level Analysis
10. A National Initiative: China MPP Study
11. Population Cohort Study in Age of Big Data – China Kadoorie Biobank
12. Halving Premature Death
13. Large-scale Clinical Trials: How to Interpret the Findings
14. Example of a Multi-center Large Clinical Trial in China
DATA SCIENCE IN HEALTHCARE APPLICATION - analysis of large, complex, heterogeneous data sets for research into the causes and consequences, and prevention and treatment of disease using big data methods.

CORE COMPETENCIES

- An overview of how to leverage large amounts of clinical, molecular, and imaging data within hospitals and in cyberspace--big data--to practice medicine more effectively.
- Knowledge of how to use electronic health records and other patient data to discover new clinical knowledge and improve healthcare
- Methods for modeling biomedical systems and for building model-based software systems
- Computational methods for the translation of biomedical data into diagnostic, prognostic, and therapeutic applications in medicine.

SESSIONS

1. Introduction: Data-Driven Healthcare
2. Data Sources from Clinical Practice and Research
3. Medical Data Collection and Data Exchange
4. Development of a Qualified EDC software
5. Hadoop Platform and Application Framework
6. Development in Genomic Analysis
7. Precision Medicine: Integrating Clinical and Genomic Data
8. Introductory Applied Machine Learning
9. Deep Learning for Biomedical Data
10. Data Mining and Risk Prediction
11. Data Visualization for Biomedical Applications
12. eHealth: Telemedicine and Telehealth
13. Big Data and Clinical Decision Support Tools
14. Big Data Innovations in Epidemiology and Population Health
IMPLEMENTATION SCIENCE – helping to stimulate increased policy and practice interest and facilitating the field's continuing translation from science to practice involving multiple disciplines and domains.

CORE COMPETENCIES

- Identify the major factors that limit the translation of efficacy trials to effective health programs, and describe the role of complementary research methods in the development of evidence-based health programs and policies.
- Explain appropriate research and evaluation methods to overcome impediments to implementation and facilitate timely scale-up of proven interventions with high levels of fidelity and effectiveness.
- Contextualize and explain real-world examples in which efficacious interventions failed or succeeded.
- Describe the framework for designing successful implementation strategies.

SESSIONS

1. Implementation Science: Getting “What Works” To Those Who Need It Most
2. Frameworks Used in Implementation Science Research
3. Theoretical Foundations of Social and Behavioral Science
4. Designing Individual-Level Implementation Strategies
5. Designing Interventions to Change Organizational Behavior
6. Community-Engaged Research
7. Key Factors for a Successful Implementation with an Example
8. Practice: Mentored Protocol Development
9. Qualitative Research Methods
10. Statistical Approaches in Implementation Science
11. Program Evaluation in Clinical and Public Health Settings
12. Translating Evidence into Policy
13. Implementation Science and the Practice of Public Health
OUTCOME RESEARCH - designed to improve health and health care through assessing healthcare quality and evaluating clinical decision making and comparative effectiveness of specific healthcare interventions.

CORE COMPETENCIES

- Knowledge of advanced comparative effectiveness research (CER) methods, with attention to quantitative and qualitative research.
- Knowledge, skills, and ability to become independent patient-centered outcomes research investigators and generate practical knowledge poised for application.
- Capacity to engage stakeholders, including patients and their caregivers, communicate about their research from inception through dissemination to a range of individuals using an array of approaches, and promote the application of the findings in practice.

SESSIONS

2. Patient-Centered Outcomes Research: Measurement and Analysis of Patient Experience
3. Comparative Effectiveness Research Based on Real-World Clinical Practice
4. Six Dimensions for High-Quality Health Care System and Disease Management Strategies
5. Data Collection Based on Medical Record: Design and Implementation
6. Using Propensity Score to Control Case-Wise Bias in Observational Clinical Research
7. Quality Control and Finding Interpretation in National Cardiovascular Data Registry
8. D2B Initiative: Changing the STEMI Care System Throughout The US
9. National Quality Measurement and Improvement in China PEACE
10. Hospital Surveillance for Safety and Quality
11. The Need for Innovation in Clinical Research and Implementation
12. A New Era of Clinical Research
HEALTH ECONOMICS AND POLICY RESEARCH – facilitating the development of high quality evidence-based research focused on health economic evaluation and policy assessment and disseminating the timely research findings to policymakers and other stakeholders.

CORE COMPETENCIES

- Develop an understanding of the Chinese health care system.
- Evaluate policy options to address health policy challenges facing in China.
- Design and recommend an effective political strategy for addressing a health policy challenge.
- Assess strengths and weaknesses of sources of data on health and health care in China.
- Deliver effective oral presentations on health policy topics.

SESSIONS

1. Introduction to Health Economics and Health Care in China
2. Basic Concept: Health Demand and Supply
3. Basic Concept: Health Financing and Total Health Expenditure
4. Basic Concept: Health Security System
5. Basic Concept: Health Policy and Resource Allocation
6. Application 1: Health Economics and Pharmaceutical Policy Development in China
7. Practice: Healthcare System and Policies in my Country
8. Human Resource Management in Health Care
9. Incentives and Performance Evaluation for Physicians
10. Application 2: Health Economics and Incentive Regulatory
13. Application 4: Medical Service Cost Accounting
14. Application 5: Economic Analysis for Health Policy in Low- and Middle-Income Countries
16. Progress in International Health Economics
17. The Role of Social Capital in China’s Healthcare Reform
Research Practice

Our Projects

a) Large-scale clinical trials

Fuwai Hospital coordinated 10 international large-scale clinical trials on innovative drugs and new indications including COMMIT/CCS-2, FOURIER and HPS2-THRIVE, that enrolled more than 100,000 Chinese patients with cardiovascular disease. The findings, which were recommended in 35 clinical guidelines in Asia, the US, and Europe, have informed and influenced global clinical practice.

<table>
<thead>
<tr>
<th>Year</th>
<th>Study name</th>
<th>Sample size in China</th>
<th>Global sample size</th>
<th>No. of sites in China</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>A Double-blind, Randomized, Placebo-controlled, Multicenter Study to Evaluate Safety and Efficacy of Evolocumab (AMG 145) in Combination With Statin Therapy in Diabetic Subjects With Hyperlipidemia or Mixed Dyslipidemia</td>
<td>450</td>
<td>900</td>
<td>12</td>
<td>In progress</td>
</tr>
<tr>
<td>2017</td>
<td>Registrational Study With Omecamtiv Mecarbil/AMG 423 to Treat Chronic Heart Failure With Reduced Ejection Fraction (Galactic-HF)</td>
<td>800</td>
<td>8,000</td>
<td>44</td>
<td>In progress</td>
</tr>
<tr>
<td></td>
<td>Ticagrelor in Patients With ST-Elevation Myocardial Infarction Treated With Pharmacological Thrombolysis (TREAT)</td>
<td></td>
<td></td>
<td></td>
<td>Published¹</td>
</tr>
<tr>
<td>2015-2017</td>
<td>Myocardial Infarction Treated With Pharmacological Thrombolysis (TREAT)</td>
<td>1249</td>
<td>3799</td>
<td>47</td>
<td>Published²</td>
</tr>
<tr>
<td></td>
<td>Further Cardiovascular Outcomes Research With PCSK9 Inhibition in Subjects With Elevated Risk (FOURIER)</td>
<td></td>
<td></td>
<td></td>
<td>Published³</td>
</tr>
<tr>
<td>2016</td>
<td>The Evaluation of Bococizumab in Reducing the Occurrence of Major Cardiovascular Events in High Risk Subjects (SPIRE)</td>
<td>338</td>
<td>16,860</td>
<td>38</td>
<td>Terminated</td>
</tr>
<tr>
<td>2011-2016</td>
<td>Randomized Evaluation of the Effects of Anacetrapib through Lipid-modification (HPS3/TIMI 55: REVEAL)</td>
<td>8629</td>
<td>22,253</td>
<td>78</td>
<td>Published³</td>
</tr>
</tbody>
</table>

³ The HPS3/TIMI55–REVEAL Collaborative Group. Effects of anacetrapib in patients with atherosclerotic
<table>
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<tr>
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<th>Global sample size</th>
<th>No. of sites in China</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2012</td>
<td>Treatment of HDL to Reduce the Incidence of Vascular Events (HPS2-THRIVE)</td>
<td>10,932</td>
<td>25,673</td>
<td>72</td>
<td>Published4,5</td>
</tr>
<tr>
<td>2010-2011</td>
<td>Thrombin Receptor Antagonist for Clinical Event Reduction in Acute Coronary Syndrome (TRA-CER)</td>
<td>112</td>
<td>12,944</td>
<td>10</td>
<td>Published6</td>
</tr>
<tr>
<td>2003-2010</td>
<td>Study of Heart and Renal Protection (SHARP)</td>
<td>994</td>
<td>9270</td>
<td>16</td>
<td>Published7,8</td>
</tr>
<tr>
<td>1999-2005</td>
<td>Clopidogrel and Metoprolol in Myocardial Infarction Trial (COMMIT/CCS-2)</td>
<td>45,852</td>
<td>45,852</td>
<td>1250</td>
<td>Published9,10</td>
</tr>
</tbody>
</table>

b) Healthcare quality assessment and improvement

As the National Center for Clinical Care Quality Management on Cardiovascular Diseases, we have established the first nationally representative quality assessment network11, which has been serving as a continuous engine generating knowledge on gaps in performance12. We are developing and testing targeted quality improvement tools and strategies including a performance monitoring and feedback system, clinical decision support tools, and mHealth applications, which have already shown their potential to improve performance.

c) Mega population cohort and biobank

Fuwai Hospital has established the largest population cohort worldwide, with 2.7 million persons of all 56 ethnicities enrolled in 31 provinces\textsuperscript{13}. Detailed information on demographic, socioeconomic, behavioral, and clinical characteristics, as well as bio-specimens and medical images collected, could generate a genetic and phenotypic landscape of the Chinese population. A 2500 m\textsuperscript{2} bio-sample repository with 15 million DNA, RNA, serum, plasma, and tissues samples, particularly from individuals with a variety of rare phenotypes, establishes a foundation for future pathogenetic mechanism exploration and treatment target identification.

d) Health policy and system research

Fuwai Hospital is leading the nationwide chronic disease management in China’s primary health care system. A set of new strategies including online staff training, real-time data collection, and accountable performance assessment, combined as an “iron triangle,” has been piloted in several provinces, such as Yunnan. We are chairing the Lancet Commission on Primary Health Care in China, which proposed a “China Solution” to challenges of chronic diseases for low- and middle-income countries by pooling global expertise. Furthermore, we have been architecting a learning healthcare system that generates new knowledge based on data from everyday practice, to inform clinical practice and policy making\textsuperscript{14}.

e) Health big data and artificial intelligence

We have established a robust Hadoop-based data science platform as a central repository for more than 2PB healthcare data, including medical records, population surveys, clinical images, and genetics lab results. The high-performance system can ingest, organize, and normalize data from many sources, and also apply next-generation methods and tools that employ these data assets and produce useful information and interventions, including clinical decision support tools and interactive performance dashboards.


Our collaborative network

a) Government

Multiple departments in the National Health Commission and the Ministry of Science and Technology, as well as all the 31 Provincial Health Commissions in China.

b) Health care institutions

More than 1600 tertiary and secondary hospitals, as well as 6500 primary health care institutions from all 31 provinces in Mainland China.

c) Academics

Worldwide leading institutions in related field.

- Clinical Trial Service Unit and Epidemiological Studies Unit, University of Oxford (https://www.ctsu.ox.ac.uk/)
- Center for Outcomes Research and Evaluation, Yale University (https://medicine.yale.edu/core/)
- Harvard T.H. Chan School of Public Health, Harvard University (https://www.hsph.harvard.edu/)
- LSE Health, London School of Economics and Political Science (http://www.lse.ac.uk/lse-health)
Teaching Board

Chen Wang  
Academician of Chinese Academy of Engineering  
President of Chinese Academy of Medical Sciences and Peking Union Medical College

Lixin Jiang  
Professor of Cardiology  
Assistant Director of National Centre for Cardiovascular Diseases. Vice President of Fuwai Hospital

Liming Li  
Professor of Public Health, PKU  
Vice President of PUMS

Richard Peto  
Professor of Medical Statistics and Epidemiology, Co-director, Clinical Trial Service Unit and Epidemiological Studies Unit, Oxford

Harlan M Krumholz  
Member of the US National Academy of Medicine  
The Harold H. Hines, Jr. Professor of Medicine and Epidemiology and Public Health at Yale University

Shengshou Hu  
Academician of Chinese Academy of Engineering  
Director of National Centre for Cardiovascular Diseases, President of Fuwai Hospital

Zhe Zheng  
Professor of Cardiovascular Surgery  
Assistant Director of National Centre for Cardiovascular Diseases, Vice President of Fuwai Hospital

Yuanli Liu  
Professor of Health Policy and Management  
Head of the School of Public Health, PUMS

Richard Horton  
Editor-in-Chief of The Lancet

Mark McClellan  
The Robert J. Margolis Professor of Business, Medicine, and Policy, and founding Director of the Duke-Margolis Center for Health Policy at Duke University
Gauden Galea
WHO Representative in China

Eric David Peterson
Professor of Medicine, Fred Cobb, M.D. Professor of Medicine
Director, Duke Clinical Research Institute, Member in the Duke Clinical Research Institute

Elias A. Mossialos
Professor in Health Policy
Brian Abel-Smith
Professor of Health Policy and Head of Department in the Department of Health Policy, LSE

Jane Armitage
Professor of Clinical Trials and Epidemiology, and Honorary Consultant in Public Health Medicine, MRC PHRU Programme Leader

Winnie Yip
Professor of Global Health Policy and Economics in the Department of Global Health and Population at the Harvard T.H. Chan School of Public Health

Zhengming Chen
Professor of Epidemiology
MRC PHRU Programme Leader, Clinical Trial Service Unit and Epidemiological Studies Unit
Admission

Before You Apply

Application Deadline: 30th September, 2018

Applicants may log in online application system (http://ncrc.fuwai.com/mph) to apply.

Date of Entry: 06th December, 2018

Please refer to admission notice for the specific date of enrolment.

Requirements for entry in 2018

Following equal opportunity principles, applications will be assessed in consideration of an applicant’s capability to meet the following entry requirements (flexibility is possible given applicants’ working experience and academic research ability):

- 18-35 years old
- Non-Chinese nationals with valid passports.
- Bachelor's degree in clinical medicine, biology, mathematical statistics, computer science, or other related programs
- The highest diploma certificate awarded by universities which should be included in the List of Universities Authenticated by the Ministry of Education (Annex 1).
- No infectious diseases and physical or mental disorders that affect learning ability
- Applicants whose native language is not English should have a minimum TOEFL score of 90 or an IELTS score of not less than 6.5. Applicants whose first language is English are exempt from the language test requirement, with provision of a copy of passport, transcripts, and undergraduate diplomas.
- Priority is given to applicants with basic knowledge of Chinese.
- Priority will be given to those who has already got an MD
When You Apply

Application materials

(Applicants should truthfully fill in and submit the following materials, and please fill in the Admission application form and apply online at http://ncrc.fuwai.com/mph. Fuwai Hospital may require additional materials if deemed necessary.)

A complete application consists of the set of documents below:

• **A copy of passport.**

• **Original copy or notarial deed of highest diploma certificate.** (Graduating applicants must submit a pre-graduation certificate or a study certificate. After being accepted they must hand in their diploma or graduation certificate before they get their notice of acceptance.) Documents in languages other than Chinese and English should be accompanied by a certified translation.

• **Original copy or notarial deed of undergraduate transcript.** Documents in languages other than Chinese and English should be accompanied by a certified translation.

• **Copies of English Proficiency Test transcripts.** Applicants for English instruction major are required to provide TOEFL or IELTS scores (Except for native English speakers).

• **Personal statement.** The statement, which must be less than 1500 words in Chinese or English and in paper form, should include research proposal, personal study experience, working experience, hobbies, expertise, and motivation (Annex 2). A clip of a self-introduction video within 1 minute in length can also be included. The title of the video should be named as “Name + Nationality” and sent to study@fuwai.com.

• **Two recommendation letters.** Recommended by experts with qualification as Associate Professor or above (or with similar qualifications). Written in Chinese or English with valid signatures and contact information (telephone and email) (Annex 3).

• **Published academic papers** (if applicable).

Admissions

Offers and Visa Application Form for Study in China (JW202) will be sent to the admitted applicants through e-mail before 26th October 2018. Admission results will be released on the official website of Fuwai Hospital.
Enrolment

Applicants should go to the Chinese Embassy/Consulate with passports, the admission offer and Visa Application for Study in China (JW202) to apply for the entry visa (X1), and these materials are also required when registering with Fuwai Hospital. Within 30 days after arriving in China, the X1 visa must be converted into a residence permit for study purpose. Students who apply with the Certificate of an Enrolled Student must submit the original or notarized diplomas once they are enrolled. Applicants will be denied admission for failure to provide the diplomas.

Support and Financial Aid

• Free tuition
• Free accommodation: Fuwai Hospital will arrange accommodations after registration.
• Scholarships and living allowance: According to relevant standards.
• Comprehensive health insurance for international students: The Chinese Ministry of Education stipulates that foreign students coming to China must purchase medical insurance in China. Our school will purchase group comprehensive insurance for all students enrolled in this program after registration, so you do not need to arrange one by yourself.

Further Information

Admitted applicants must register at school on time according to the regulations of the receiving institution. Enrolment will be denied if an applicant fails to do so.

Enrolment will be cancelled for those who cannot pass the admission health examination.

Those who have been admitted to school but suffer from serious illness must leave the program temporarily and return to their own country to recuperate (at their own expense). If they fail to complete their studies on time, their cases will be handled according to relevant training regulations of the Peking Union Medical College.

Fuwai Hospital reserves the right for the final explanation.
Contact Us

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