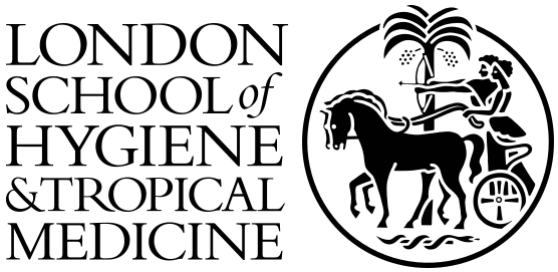

Are we PrEPared to provide?

Developing a theory-informed survey to measure the needs of Taiwan's community-based 'Sexually-Transmitted-Infection-Friendly Physicians' to deliver HIV pre-exposure prophylaxis (PrEP)

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Abstract

Background: Pre-exposure prophylaxis (PrEP) is key to ending the HIV epidemic in Taiwan, where men-who-have-sex-with-men (MSM) contribute to 79% of annual new infections. Community-based sexually-transmitted-infection-friendly physicians (CSTIPs) practise outside hospitals and are certificated by the Taiwan Centers for Disease Control to provide patients with treatment and prevention of sexually transmitted infections. CSTIPs have potential to deliver optimal decentralised PrEP services to MSM, but only two per cent of them prescribed PrEP in 2019. This thesis aims to develop a theory-informed questionnaire to measure the unmet needs of CSTIPs for delivering HIV PrEP services in Taiwan.

Methods: This pragmatic qualitative research comprises two sequential phases as formative research and questionnaire development, applying a combination of the capability–opportunity–motivation–behaviour (COM-B) model and the Theoretical Domains Framework (TDF). The Formative Phase applied document research and 16 face-to-face in-depth interviews with CSTIPs in Taiwan. The diversity of interviewees was ensured through the purposive sampling of experience in PrEP prescribing, medical speciality and geography. I analysed the data using the COM-B/TDF framework to identify CSTIPs' needs for PrEP service provision. In the Development Phase, I generated an item pool for the anonymous, self-administered online questionnaire in Traditional Chinese (the official written language of Taiwan) using the findings in the Formative Phase. All preliminary items were then evaluated by eight CSTIPs through cognitive interviews and by six experts in my survey committee. Based on the feedback from both sources, I optimised the content, logic flow and layout of the final questionnaire in Traditional Chinese.

Results:
Formative Phase: Unmet PrEP prescribing needs of CSTIPs are identified in all three COM-B components and 14 TDF domains. CSTIPs expressed a wide range of needs for delivering PrEP services in the National PrEP Programme due to limited capabilities, missed opportunities and low motivation. Their needs highlighted the political and social milieux of Taiwan's centralised PrEP care system and multi-faceted PrEP stigma. Types and the extent of unmet needs varied between PrEP adopters and non-adopters, but both groups reported a marked demotivation, including: lack of professional confidence; personal biases and moral judgement towards MSM; disbelief in positive health outcome of PrEP; minimal incentives and anticipated administrative burden of and distrust in governmental programmes.

Development Phase: Of all 76 initial items, 15 remained unchanged and six were removed after three rounds of cognitive interviewing with revisions. Comprising 70 items in four sections, the final Traditional Chinese questionnaire is culturally sensitive, theoretically attested and primed for measuring the needs of CSTIPs. Items on all 14 TDF domains were designed to measure CSTIPs' needs for delivering PrEP services. Except for the Emotion domain, all TDF domains were covered by items identifying stakeholders who could satisfy CSTIPs' needs.

Conclusion: The wide-ranging needs of CSTIPs for PrEP prescribing are fully captured by the COM-B/TDF framework. It is feasible to develop an acceptable comprehensible survey to measure CSTIPs' unmet needs that can guide professional development interventions. Future administration of the developed questionnaire will inform actionable and needs-based policies that decentralise PrEP service delivery, which may increase users' accessibility to PrEP services, ultimately maximising the impact of PrEP on ending AIDS in Taiwan.

Integrating Statement

As a physician dedicated to ending the AIDS pandemic, I aspire to become a public health practitioner advocating universal access to HIV prevention, including pre-exposure prophylaxis (PrEP). The four-year journey of the DrPH programme at LSHTM has provided me with the knowledge and skills for evidence-informed policymaking, organisational management and leadership in public health. The two DrPH research studies, the Organisational Policy Analysis (OPA) and my thesis project, granted me great opportunities to transform knowledge into the practice of implementation research, PrEP advocacy and international leadership.

The initial two intense 11-week modules have extended my knowledge of public health policies and management science while elevating my research skills from master to doctoral levels. In the first module, Evidence-Based Public Health Policy (EBPHP), I have learned how to clearly define public health problems, systematically synthesise and critically evaluate evidence from various sources and strategically design plans for influencing policymaking. I capitalised on the EBPHP assignments by tailoring them to my research projects and honing my skills for systematic reviews and critical appraisal, which are pivotal for my studies. I also proposed a strategic report on how the Taiwan AIDS Society (TAS) can exercise its influence on pertinent stakeholders to promote the implementation of PrEP in Taiwan, which inspired my OPA and thesis project. The positive feedback and grades on both assignments boosted my confidence in research skills, academic writing and critical thinking.

The second module, Understanding Leadership, Management and Organisations (ULMO) orientated me to the world of management science and organisational theory while making me aware of multi-sectorial challenges and opportunities for programmatic implementation at institutional and societal levels. The assignment allowed me to exercise theory-informed strategic analyses of non-governmental organisations. I learned how to generate logical, context-specific and evidence-informed recommendations to advance my OPA project study design and theoretical underpinnings.

Integrating learning and reflections from both modules, I decided to conduct my OPA project on an international organisation that focusses on HIV prevention in Asia-Pacific, my home region. To date, few studies have concentrated on the roles and effects of regional bureaucracies on non-state actors. While preparing for the OPA fieldwork, I undertook a master's module 'Qualitative Methodologies' at LSHTM and training sessions on interviews,

documentary research and writing qualitative reports through the Bloomsbury Postgraduate Skills Network. Applying the communication skills from the ULMO, evidence synthesis from the EBPHP and my knowledge for HIV prevention, I successfully won the trust of the UNAIDS Regional Support Team for Asia and the Pacific, the host organisation of my OPA study in Bangkok, Thailand. Grounded on theories of international bureaucracies, my OPA focussed on how the host organisation influenced other regional stakeholders in achieving the UNAIDS 2019 Targets and Priorities of HIV prevention among young people.

My five-month fieldwork (including participatory observation and interviews) deepened my understanding of the complex process of both policy advocacy and implementation of HIV prevention programmes at international, regional and country levels. The OPA also offered an opportunity to improve my interview skills with professionals in a time-limited environment. I practised critical thinking, active listening and self-reflexivity by recognising the dynamics between myself, interviewees and the host organisation. In addition, my study placement in Bangkok, the hub for HIV research, advocacy and up-to-date implementation programmes in Asia-Pacific, has expanded my network with international scholars and practitioners promoting PrEP implementation. The conversations and knowledge exchange at regional consultations and the 2018 International AIDS Conference all contributed to the development of my current thesis.

Learning from the findings of my OPA report, I comprehend how regional bureaucracies may influence key stakeholders to promote political advocacy for HIV prevention at intra- and inter-organisational levels. Receiving an immediate pass for my OPA report and being selected as an oral presenter at the 2020 European Conference on Political Research increased my confidence in my findings, which received positive comments from the conference panel. My debut presentation at a political science conference widened my scope for policy analyses. Moreover, this experience consolidated my belief that public health challenges require solutions from multidisciplinary collaborations with non-health sectors (e.g., researchers in political and organisational science) rather than closed-door discussions among public health researchers and policymakers.

By conducting the OPA project, I comprehend the process of a research cycle from problem identification, study design and preparation (including obtaining ethical approval from relevant bodies and risk management), data collection and management, data analysis and reporting. My learning from the OPA provided insights into my thesis project design and expedited preparation for it.

A critical learning point for me is to recognise the feasibility of my research proposal. Originally, I planned to conduct a mixed-methods study by collecting both qualitative and quantitative data from Taiwanese physicians while developing and administering a physician-tailored survey. During my DrPH Review (equivalent to PhD Upgrade) in April 2019, my Review Panel suggested that I narrow my research plan by removing some objectives given the limited time for research and thesis write-up. Acknowledging feasibility is key to successful research, I decided to adjust my thesis focus to questionnaire development, with the creation of a theory-informed questionnaire as my final objective. Adapting to this change in research focus, I took additional three training courses with the UK Social Research Association on designing questionnaires, conducting cognitive interviews and analysing narratives. Reflecting on my decision, I am grateful that I accepted the Panel's suggestions on replanning because all stages of the research process have taken longer than I had anticipated. The change in focus of my research also made it possible to complete my qualitative data collection and analysis during the current COVID-19 pandemic. Again, the communication, leadership and analytical skills I acquired from the taught modules, training sessions and the OPA project fieldwork have helped me overcome the challenges encountered in research activities since March 2020.

Through the research-related activities I have pursued across my two pieces of research, I have also learned how to more effectively engage with policymakers, other academic researchers and people who may benefit from my findings.

With the Taiwan AIDS Society, I updated the 2018 Taiwan national PrEP guideline and was the lead author of their publication in the *Journal of Microbiology, Immunology& Infection* (see Reference No. 12). I presented preliminary findings from the thesis at two international HIV conferences. I also participated in regional advocacy for upscaling PrEP roll-out in Asia-Pacific and moderated two educational workshops on improving PrEP awareness among Taiwanese healthcare workers. Responding to the current COVID-19 pandemic, I collaborated on a systematic review of the potential social consequences of mass quarantine during epidemics. I was the lead author of its publication in October 2020 in the *Journal of Travel Medicine*. This experience used and developed my skills in synthesising and interpreting mixed-methods evidence.

To sum up, my interconnected activities and learning throughout the DrPH programme have allowed me to develop into a self-reflective, compassionate and transformational leadership style. I am well-prepared to tackle challenges, embrace opportunities and share my passion for improving public health in the post-COVID-19 Anthropocene.

Acknowledgements

The completion of my thesis would not have been possible without the nurturing and wholehearted support of Dr Ford Hickson, my best supervisor, enlightener and life mentor since my first day at the London School of Hygiene & Tropical Medicine (LSHTM). His thought-provoking advice and pragmatic insights are fundamental to my progress throughout the exhilarating DrPH journey. I am also extremely grateful to my second supervisor, Dr Helen Burchett, for her continual support and constructive advice that hones my critical thinking.

I would like to extend my sincerest gratitude to my sponsor and alma mater, National Yang-Ming University (renamed as National Yang Ming Ciao Tong University [NYCU] in 2021) for granting me a full scholarship for my doctoral study at LSHTM. I am deeply grateful to Professor Chen-Huan Chen, Ambassador Hsu-Sung Kuo, Professor Yiing-Jenq Chou, Professor Jiing-Feng Lirng, Professor William J. Huang, Professor Nicole Huang and Professor Yung-Yang Lin at NYCU for their full support and encouragement during my fieldwork in Taiwan.

I am also very grateful to all six distinguished scholars in my advisory group: Professor Nai-Ying Ko, Dr Carol Strong, Dr Chia-Wen Li, Dr Stephane Wen-Wei Ku, Dr Adam Bourne and Dr Yen-Fang Huang. I sincerely appreciate their invaluable insights into and context-specific advice on my research process. I must also thank Dr Rachel Baggaley from WHO, Professor Peter Piot and Professor Heidi Larson at LSHTM, Dr Heather-Marie Schmidt, Mr Eamonn Murphy and Mr Taoufik Bakkali from UNAIDS for their profound beliefs in my work and for broadening my perspective of combination HIV prevention. I very much appreciate my DrPH Review Panel, Dr Stefanie Ettelt, Dr Rebecca French and Dr Kathryn Oliver for providing me with constructive criticism that consolidates my study focus. Thanks should also go to Ms Huei-Jiuan Wu at the Kirby Institute as well as all scholars affiliated with the LSHTM Sexual Health Research Group because they have believed in the value of my study.

Next, I would like to acknowledge the invaluable support from the following institutions: the Taiwan Centers for Disease Control, Public Health Bureaus, the Taiwan AIDS Society, the Taiwan Association of Family Medicine, the Taiwan Association of Obstetrics and Gynaecology (special thanks to Dr Jian-Pei Huang) and the Taiwan Urological Association (special thanks to Dr Yu Chen and Ms Wan-Shan Chen). I am very grateful to professionals who have never wavered in their support and insightful guidance: Dr Chia-Wen Lee, Dr Yi-Jen Wang, Ms Chia-Yin Hsieh, Ms Ying-Ru Chang Chien, Mr Yu-Sheng Chu and three

research assistants from Dr Carol Strong's research centre (Ms Yi-Fang Yu, Ms Yu-Ju Hung and Mr Chieh-en Liao). I would also like to thank all physicians who have spared time and effort for participating in my research.

Subsequently, I am very grateful to all my DrPH classmates, who have encouraged me to strive for excellence since the inception of my study. Many thanks to Julia, Natalie, Heather, Diogo, Jordan and Patricia who have cheered me up at various challenging moments. Also, I have had a great pleasure of studying with the smartest and most caring peers at the LSHTM Research Degree office at 9 Tavistock Place, including Alexandra, Els, Esther, Fiona, Harriet, Henry, Ji-Yeon, Kaat, Kelly, Li, Leesa, Mateusz, Nikita, Nour, Nuri, Prima, Syreen and Tim. In addition, I am utterly thankful for the invaluable guidance provided by our DrPH programme director Professor Nicki Thorogood as well as administrative assistance from Agata, Anne-Marie, Joanna and Renee.

I truly appreciate all culinary, cognitive and mental support from my incredible friends worldwide (in alphabetical order): Adam, Argenis, Barbara, Bo-Yi, Cheng-Pei, Chen-Wen, Chih-Yuan, Debbie, Denny, Fletcher, Grace, Hannes, Heng-Hao, Ines, Kate, Kelly, Liang-Yu, Mao-Hsuan, Matt, Meng-San, Po-Hsuan, Po-Yao, Pei-Fu, Pei-Hao, Peter (Po-Han), Rod, Roy (Kuo-Yuan), Vladanka and Yannis. Special thanks to my best friend Andrew Po-Liang Chen who has firmly supported my fieldwork in Taiwan and tolerated my hectic schedules during waves of COVID-19 pandemics. I am also very grateful to Yin-An and Tim, both of whom have offered me a comfy place in London since March 2020, so I can successfully conquer the continuing challenges in waves of the COVID-19 pandemic.

Lastly, I wholeheartedly appreciate the unconditional support and love given by my mom, dad, sister Dylan (Yung-Chung) and wonderful cousins. Thank you for tirelessly reaffirming my talents and encouraging me to pursue my goals for a healthier world.

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Abbreviations

ART	Antiretroviral treatment
COM-B	Capability–opportunity–motivation–behaviour
CSTIP	Community-based sexually-transmitted-infection-friendly physician
HCM	HIV case manager
ID	Infectious disease
MOHW	Ministry of Health and Welfare
MSM	Men who have sex with men
National Programme	Taiwan CDC National PrEP Programme
NHI	National health insurance
PAP	Patient assistance PrEP programme
PAPA	Provider-assisted PrEP access programme
PCP	Primary care physician
PHB	Public health bureau
PLWH	People living with HIV
PrEP	Pre-exposure prophylaxis
STI	Sexually transmitted infection
STIP	STI-friendly physician
TAS	Taiwan AIDS Society
TCDC	Taiwan Centers for Disease Control
TDF	Theoretical Domains Framework
TWD	New Taiwan dollar
WHO	World Health Organization

Chapter 1 Introduction

1.1 Overview of the thesis

This thesis reports the development of a questionnaire to measure the unmet needs of physicians for delivering HIV pre-exposure prophylaxis (PrEP) services in Taiwan. Among all types of service providers, I focus on 'sexually-transmitted-infection (STI) friendly physicians', a group of clinicians certificated by the Taiwan Centres for Disease Control (TCDC) to provide sexual health services. Specifically, my target population is certified 'STI-friendly physicians' who work in non-hospital settings, what I define as community-based STI-friendly physicians (CSTIPs). I argue that CSTIPs are well placed to prescribe PrEP, a biomedical HIV prevention service that should be decentralised to benefit all populations in need. My thesis explores what CSTIPs require to deliver PrEP services, describes a theory-informed and data-driven process of questionnaire design and generates recommendations on fulfilling CSTIPs' needs for expediting PrEP implementation in Taiwan.

1.2 PrEP: a comprehensive sexual health service

PrEP is proven to be highly effective in preventing HIV infection. Using two medications (tenofovir and emtricitabine) of antiretroviral therapy (ART), PrEP reduces the risk of HIV infection by up to 99% when taken as prescribed.[1–3] Since 2014, the World Health Organization (WHO) has recommended healthcare providers prescribe daily oral PrEP to HIV-negative 'key populations',[4] defined as those who are at disproportionate risk of HIV infection irrespective of country contexts. These populations comprise men who have sex with men (MSM), transgender women, sex workers and people who inject drugs.[4] Since 2016, the WHO has recommended countries integrate PrEP into HIV prevention strategies and the Essential Medicines List,[5,6] echoing the United Nation's commitment to three million people worldwide accessing PrEP by 2020.[7] In addition to daily PrEP, the WHO also recommends the use of event-driven PrEP for MSM in its updated guidance in 2019.[8] Known as '2+1+1' or 'on-demand' PrEP, event-driven PrEP is as effective as the daily modality. Users take two PrEP tablets 2-24 hours before sex, followed by one tablet at 24 hours after and another tablet at 48 hours after the first dose.[8,9] As of 2019, 120 countries, including Taiwan, adopted PrEP in national guidelines.[10–12] The progress of its implementation varies by country contexts, including demonstration projects, national programmes and universal health schemes on PrEP provision.

Despite worldwide burgeoning PrEP adoption, the number of PrEP users is far behind the United Nation's three-million target by 2020. According to the Joint United Nations

Programme on HIV/AIDS (UNAIDS), the number of PrEP users worldwide was estimated at 845,000 in 2020, which was 28% of the ambitious target.[13] The unreached target highlights a considerable gap between countries' PrEP adoption and real-world situations of PrEP delivery. Challenges to users' access to and providers' delivery of PrEP persist in the fabric of countries' healthcare infrastructures, resource allocation and political will.

PrEP should be delivered as a comprehensive sexual health service rather than a stand-alone biomedical tool for HIV prevention. PrEP services can help individuals connect with existing healthcare services on HIV and other STIs. In doing so, PrEP services are part of a care continuum. Nunn et al.[14] proposed a PrEP care continuum that encompasses an initial consultation (including assessment of HIV risks), testing for HIV and STIs, starting PrEP and quarterly revisits to follow-up users' HIV and STI status. Phanuphak et al.[15] have further expanded the care continuum by incorporating HIV prevention and treatment into a dynamic cascade of PrEP service delivery (Figure 1.1). Once PrEP programmes reach and recruit key populations for HIV and STI testing, individuals testing HIV positive can be linked to HIV treatment, while those who are negative can access PrEP to prevent contracting HIV. Moreover, individuals diagnosed with other STIs can receive immediate treatments, thereby preventing disease transmission. By linking key populations and individuals at risk of HIV to the care continuum, a PrEP service can maximise its impact on the syndemic[16] of HIV and STIs. It also has great potential in identifying and tackling psychological and social challenges to PrEP users.[17,18]

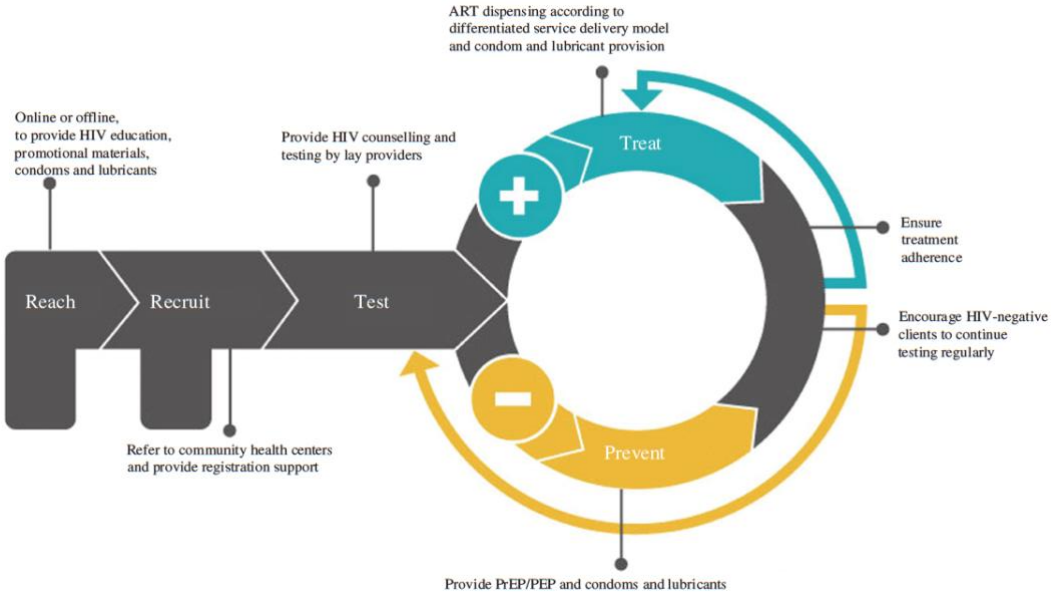


Figure 1.1 PrEP care continuum: The Reach-Recruit-Test-Treat/Prevent-Retain cascade
Source: Phanuphak et al.[15]

1.3 Limited uptake of PrEP service among MSMs in Asia-Pacific

Men-who-have-sex-with-men (MSM) account for 53 per cent of new HIV infections in Asia-Pacific.[13] However, they have low uptake of PrEP in this region.[13,19] In 2020, only nine per cent of global PrEP users were from this region, which contains more than half of the world's population.[20] I propose three possible explanations for the limited uptake. Firstly, many countries lack nationwide roll-out of PrEP. Of all 30 countries, six (Australia, Cambodia, New Zealand, Taiwan, Thailand and Viet Nam) have established PrEP programmes at national levels.[13] Nonetheless, countries with increasing HIV incidence rates (i.e., Afghanistan, Malaysia and Pakistan) and others have no or limited programmes on providing PrEP to MSM. Secondly, healthcare providers, one of the key stakeholders in PrEP delivery, may be unaware of or unfamiliar with PrEP despite nationwide roll-out. Two regional consultations have highlighted the lack of PrEP providers and addressed the urgency of capacitating providers for PrEP service provision.[19,21] Thirdly, various barriers are hindering eligible men from taking PrEP. Studies have reported unmet needs of MSM for using PrEP, including low awareness in gay communities, high monetary costs of PrEP and difficulty accessing PrEP services.[22,23]

Impactful PrEP services require countries to fulfil the needs of both communities (demand) and services (supply) at each step of the care continuum. Most PrEP-related studies in Asia-Pacific have explored the needs of MSM for taking PrEP.[24] Interventions such as community mobilisation, information dissemination through social media and user fee waivers have focussed on increasing MSM's awareness, acceptance of and access to PrEP.[21,22,24] However, there is little attention on the needs of providers, who play a crucial role in users' options and decision-making for taking PrEP. For instance, individuals with STIs may remain ignorant of PrEP if their physicians are unaware of or unwilling to provide information.[25] Conversely, providers can empower users by supporting their adherence to PrEP and retention in PrEP services. The fact that the needs of PrEP providers are under-explored may partially explain why PrEP has not been impactful at population levels.

1.4 Limited engagement of potential PrEP providers in Taiwan

My thesis aims to understand how Taiwan, a country initiating PrEP programmes since 2016, can upscale its PrEP implementation through engaging potential providers. I particularly concentrate on community-based sexually-transmitted-infection-friendly physicians (CSTIPs), whom I define as medical doctors certificated by the TCDC as 'STI-friendly physicians' with a non-hospital-based practice. Data from the TCDC reveal that most CSTIPs are from three specialities: family medicine (70%), obstetrics and gynaecology

(12%) and urology (8%).[26] Many of these physicians have formerly collaborated with the TCDC, the dedicated governmental authority for control of HIV/STIs. Initiatives have included surveillance reporting of STI diagnoses, performing combined STI/HIV testing and administering publicly funded vaccination against Hepatitis A.[27,28] I elucidate Taiwan's HIV epidemic, HIV/STI healthcare systems and evolving PrEP policies while fully justifying my focus on CSTIPs in Chapter 2.

I propose that CSTIPs are under-utilised in Taiwan's PrEP implementation and have great potential for expanding PrEP service capacity among MSM, thereby making a significant contribution to reducing the national HIV epidemic. Between 2016 and 2020, TCDC initiated a pilot project (2016-2017) followed by its national PrEP programme (henceforth, National Programme), a countrywide scale-up (2018-2020). From September 2017, CSTIPs are certified for PrEP prescribing after completing an introductory two-hour training, registering with TCDC and renewing their certificate with four-hour continuing medical education events each year.[29] The proportion of PrEP prescribers among all CSTIPs has increased from 2% (15/698) in June 2019 (when the research started) to 4% (29/706) in December 2020. Nevertheless, throughout the study, only two CSTIPs joined the National Programme. The rest of the prescribers solely provided self-paid PrEP services, in which users pay out-of-pocket to access PrEP through two private programmes without receiving government subsidies (described fully in Section 2.3.3)[30,31] The reasons why few CSTIPs participated in PrEP service delivery, particularly in the National Programme, remain unknown.

1.5 Surveying the needs of healthcare providers for PrEP delivery

Understanding the needs of healthcare providers is key to upscaling any new intervention.[25,32] Providers should be viewed not as apparatus to the healthcare facilities but as individuals with varying extents of needs for action. For example, providers need knowledge, skills and memory of PrEP before prescribing it to users. Physicians may also require sufficient time and physical space at premises to assess the eligibility of potential PrEP users. Thus, if healthcare providers' needs are not considered, the needs of PrEP service users will remain unmet. In this situation, PrEP will not efficiently incorporate itself into existing sexual health services, thus making little contribution to curbing the HIV epidemic. Addressing the needs of providers can increase the number of services and improve the quality of the PrEP care, which ultimately fulfils the needs of individuals for accessing PrEP.[25,32]

Among various approaches applied to needs assessment, I adopted a survey design to generate systematic data on providers' needs for PrEP service provision. A survey questionnaire is advantageous for collecting standardised numerical data through sampling to inform policymaking in public health.[33,34] To my knowledge, no questionnaires tailored to the needs of PrEP providers exist in Taiwan. A context-specific questionnaire that measures the varying needs of providers is crucial to informing Taiwan's PrEP implementation in the future.

1.6 COM-B/TDF as service provision needs

There is no universal agreement on the definition of needs. Among a plethora of needs theories (described in Chapter 3), my definition of needs arises from a combination of two frameworks: the capability–opportunity–motivation–behaviour (COM-B)[35] model and its elaboration, the Theoretical Domains Framework (TDF).[36] The COM-B model denotes that human behaviour occurs when individuals are capable, are motivated and have opportunities for doing so. For example, health service provision requires that healthcare workers have the capability, opportunities and motivation to provide services, which I define as 'service provision needs.' Furthermore, the TDF model expands the COM-B into 14 distinct theoretical domains to demonstrate the diversity of needs as well as to design needs-informed behavioural interventions.

A combination of the COM-B and the TDF can be suitable for assessing the needs of healthcare providers. In their seminal book *The Behaviour Change Wheel*, Michie et al. have employed the integration to identify potential barriers for physicians to delivering PrEP services.[37(p233)] Nevertheless, no published studies on physicians' PrEP prescribing have employed either the COM-B or the TDF as theoretical foundations. Grounded on the theoretical basis, my thesis generates fresh insights into measuring the needs of PrEP providers through the combined COM-B/TDF framework, which I illustrate in Chapter 3.

1.7 Aim and objectives of the thesis

To maximise the impact of PrEP on the HIV epidemic, Taiwan needs to ensure that its service capacity can meet users' demands as they grow by commissioning more PrEP providers. Understanding CSTIPs' lack of engagement in PrEP prescribing is the key to increasing PrEP service capacity nationwide. This thesis aims to create a measurement tool to better understand the limited engagement of CSTIPs with the National Programme.

The three Objectives of this thesis are to:

1. describe the policy and social context of the Taiwan CDC National PrEP Programme;
2. identify and describe the perceived needs (guided by the COM-B and the TDF model) of CSTIPs for delivering PrEP services to MSM;
3. design a theory-informed questionnaire to measure the extent of CSTIPs' unmet needs for providing PrEP services to MSM.

It should be noted that the study aims to develop a theory-informed questionnaire in Traditional Chinese (the official written language of Taiwan) without administering the developed instrument. This decision accords with the suggestions from my Doctor of Public Health (DrPH) Review panel at LSHTM (equivalent to a PhD Upgrade committee), reflecting the nature of the DrPH thesis as an 18-month project with limited scopes.

1.8 Structure of the thesis

My thesis comprises eight chapters throughout two study phases to create a theory-informed, context-tailored questionnaire.

Chapter 2 describes the context of my study – Taiwan. The chapter introduces the HIV epidemic, the healthcare system, physicians providing sexual health services and the National Programme in Taiwan. Next, I provide an overview of HIV stigma and medical professionalism to reflect on the environment where CSTIPs practise. I further discuss decentralised models for PrEP service delivery and show evidence on the suitability of CSTIPs as PrEP providers. This chapter concludes with a snapshot of physicians' unmet needs for PrEP service delivery as well as knowledge gaps in the literature.

Chapter 3 lays out the philosophical and theoretical foundation of the research by expounding the COM-B/TDF framework with an overview of theories of needs in public health research.

My investigation is in two Phases, which I describe sequentially. Phase One is the formative phase that informs survey development through qualitative explorations (for which Chapter 4 reports the methods and Chapter 5 presents the results). Phase Two is the iterative process of questionnaire development (for which Chapter 6 describes the methods and Chapter 7 displays the results).

Chapter 4 demonstrates my study design using a two-phase approach. This chapter also sets out the methodology in Phase One (formative phase) by describing how I conducted document research and in-depth interviewing for data collection while using a framework method for analysis.

Chapter 5, the first result chapter of my thesis, analyses the findings from Phase One. It described the context of the National Programme from 2018 to 2020 while revealing the needs perceived by CSTIPs for providing PrEP services, both of which meet Objective 1 and 2 of my thesis. The presentation of the findings reflects on the COM-B/TDF framework to consolidate theoretical coherence.

Chapter 6 is concerned with the methods used in Phase Two (questionnaire development phase). This chapter describes methods for questionnaire development in sequence. The process constitutes a theory-informed generation of items, revisions of items using cognitive interviewing and a survey expert panel, followed by improvement and optimisation of the questionnaire for measuring CSTIPs' needs.

Chapter 7 addresses the results of Phase Two by presenting the finding from qualitative pretesting and iterative revisions of the theory-informed questionnaire. The chapter catalogues issues raised by both interviewed CSTIPs and the survey committee as well as considerations of each section in the questionnaire. At the end of the chapter, I present all revised items, response sets with an optimised layout for this self-administered online questionnaire, which meets Objective 3 of my thesis.

Drawing upon the chapters above, Chapter 8 discusses the key findings of my thesis and how the thesis can advance the knowledge front of PrEP implementation research. The chapter also underlines the limitations of my study, plans for administering the developed questionnaire and implications for policymaking and future research. Given the applied nature of DrPH, this final chapter concludes by offering recommendations on fulfilling CSTIPs' service provision needs and thereafter upscale PrEP implementation in Taiwan.

Chapter 2 Background and Literature Review

2.1 The HIV epidemic in Taiwan

Since 1984, there have been 41,033 people diagnosed with HIV infection in Taiwan, a densely populated country with 23.5 million inhabitants.[38,39] Although the HIV prevalence in Taiwan is low at 0.13%, the HIV epidemic disproportionately affects MSM. Of people being diagnosed from 1984 to 2020, only 3% are women and 81% of the men are self-identified as MSM.[40,41] In 2020, MSM accounted for 79% of new diagnoses, 69% of which were aged between 25 and 49.[38] Two studies conducted through outreach programmes revealed the HIV prevalence among MSM was 33 times higher than the national prevalence (4.3 versus 0.13 per cent).[42,43] These data underline that MSM are critical to the HIV epidemic and those who can most benefit from PrEP services in Taiwan.

2.1.1 Impact of combination HIV prevention

In 2018, new HIV diagnoses in Taiwan have dropped for the first time in a decade (Figure 2.1).[44] Among MSM the drop was 22.7%.[40] This turning point can be attributed to three interconnected elements. To begin with, since 1997, the Taiwan government has provided people living with HIV with free antiretroviral treatment (ART) and comprehensive case management.[45] Next, since 2016, the TCDC has distributed fully-subsidised HIV self-testing kits to increase individuals' affordability of HIV testing and willingness to seek confirmatory testing.[46,47] Regarding the UNAIDS '95-95-95' targets by 2030,[48] Taiwan has reached '84-88-94' in 2018,[49] indicating that among all people living with HIV in Taiwan, 84% know their status, 88% of those diagnosed have started ART and 94% of those on treatment have suppressed HIV. Finally, from 2016, the TCDC has initiated PrEP projects for MSM and individuals in serodiscordant relationships,[50] which may also contribute to the decline. Together with the HIV care continuum, PrEP is critical for Taiwan to successfully 'ending AIDS by 2030'.[48]

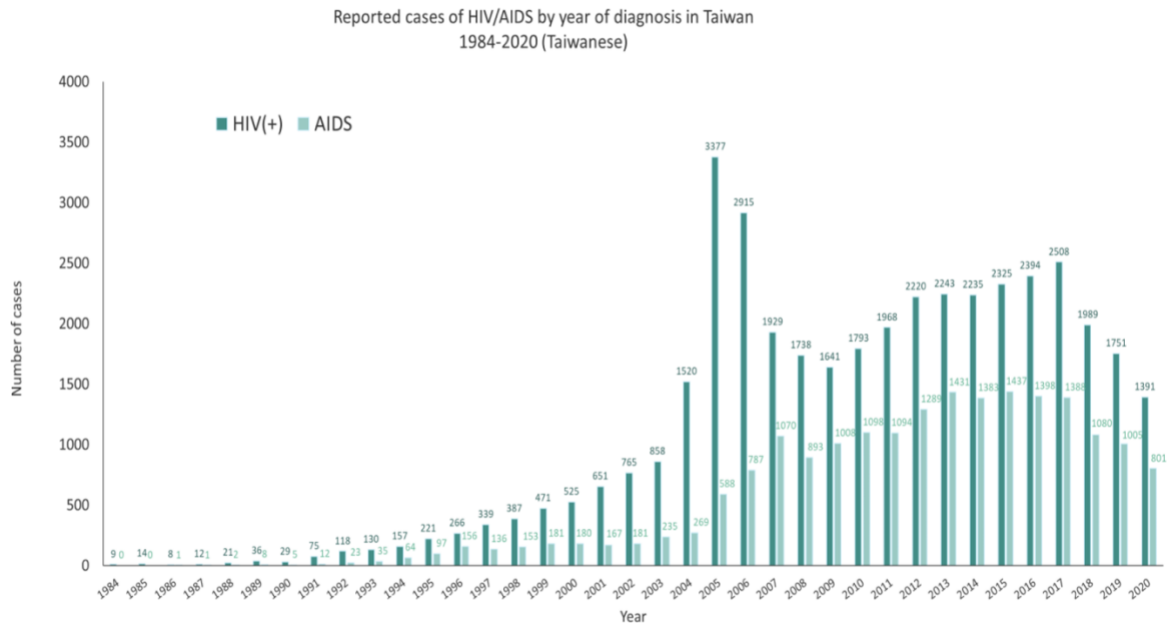


Figure 2.1 The number of reported HIV and AIDS cases in Taiwan per annum, 1984-2020
Note: The epidemic peak in 2005 is attributed to outbreaks among people injecting drugs, which facilitated the initiation of nationwide harm reduction programmes.[51] Source: Taiwan Centers for Disease Control.[44]

2.1.2 PrEP stigma: worldwide evidence

Because PrEP is using anti-HIV drugs, it and its users are subjected to multiple stigmas regarding HIV, sex and key populations. Summarising global publications on PrEP-related stigma, Golub defines PrEP stigma as a subtype of sexual stigma arising from 'conscious or unconscious discomfort of sexual expression unfettered by the threat of HIV'.[52] Grounded on theoretical underpinnings of HIV stigma,[53] two reviews from the US summarise that users experience, perceive, internalise and challenge PrEP stigma enacted at both interpersonal and societal levels.[54,55] Several studies have indicated that PrEP stigma can be a formidable barrier to populations' access to and utilisation of PrEP services.[55–58]

Documented PrEP stigma comprises three main aspects. Firstly, PrEP users may be misinterpreted as HIV-positive by their sexual partners and family due to similar uses of antiretrovirals. A Kenyan study highlights that such stigma associated with HIV impedes PrEP uptake among potential beneficiaries.[59] Secondly, PrEP-taking is labelled as an intention to engage in condomless sex. Concerns over PrEP-related risk compensation (i.e., individuals change their sexual practices based on perceived risks of HIV) may ascribe to users socially unfavourable stereotypes, such as promiscuity and sexual disinhibition.[60] Thirdly (and relatedly), PrEP users may be regarded as the driving force of STI transmission.

Such stigma may limit users' access to PrEP from healthcare systems. Studies have shown that concerns over increasing STIs might deter providers from prescribing PrEP to populations who can most benefit from it.[61–63]

Despite emerging evidence worldwide,[59,64–67] PrEP stigma is very little researched in Taiwan in terms of its mechanism and consequences. One study explores how Taiwanese PrEP users managed the multifaceted stigma when exhibiting themselves as 'HIV negative, on PrEP' in digital-based sexual communications.[68] Two reviews underscore that PrEP stigma in healthcare facilities may impede PrEP scale-up in Asia-Pacific.[69,70] However, there is no published research on how PrEP stigma may influence providers' behaviour and their PrEP prescribing needs in Taiwan. This is despite a body of research on HIV stigma and discrimination in Taiwan, which I summarise in the next section.

2.1.3 HIV stigma and discrimination in Taiwan

HIV stigma is pervasive in Taiwan. According to Link and Phelan,[71] HIV stigma occurs when people living with HIV (PLWH) are labelled as individuals with uncurable infectious diseases, stereotyped as contagious and immoral, segregated from the public as 'others', losing social status and then discriminated by HIV-negative individuals and institutions in society. Stigma can affect individuals through activities and practices at personal, interpersonal and structural/social levels.[71] According to Taiwan's latest HIV Stigma Index report in 2018, the majority of surveyed PLWH felt stigmatised owing to the public's misconceptions of HIV transmission and fear of HIV acquisition.[72] Those who self-disclosed as HIV-positive reported being discriminated against in their education, employment and healthcare access.[73]

Some studies have argued that HIV stigma is perpetuated by Confucianism, the philosophy roots in Taiwan's society.[73–75] The tenet of Confucianism is that one should maintain morale for the harmony of society by conforming to family-centred values, obeying rules and regulations set by authorities and protecting oneself from diseases that would dishonour one's family.[76,77]

HIV stigma at the societal level has been reinforced through Taiwan's legal system that exerts power in regulating the behaviour of PLWH. Specifically, HIV-positive individuals are in jeopardy of criminalisation if they fail to obey laws and regulations designated for HIV control. Enacted since 1990, the HIV and AIDS Control Act[78] has stated that PLWH are obligated to self-disclose their HIV status before accessing medical services, having risky sex or sharing needles with others. Non-disclosure in such circumstances results in criminal

charges up to 12 years. Although the Act (renamed as HIV Infection Control and Patient Rights Protection Act in 2007)[78] prohibits discrimination against PLWH for employment and healthcare access, few PLWH take legal action against discriminatory institutions due to fear of public disclosure.[79] As a result, structural HIV stigma compounds societal HIV stigma which manifests as internalised stigma among PLWHs and populations affected by HIV.[80,81]

As MSM are in the epicentre of Taiwan's HIV epidemic, HIV stigma has spread into gay men, who are already widely discredited due to perceived inability to sustain family bloodline.[73] Since the media's widespread condemnation of a raided gay sex party in 2004, the public has devalued gay men with intersectional stigma[82] towards HIV/AIDS, promiscuous lifestyles and sexualised drug use.[83] Comparing hospital-based nurses' attitudes to homosexuality in 2005 and 2017, Lin et al. reported that public condemnation of and moral judgement against homosexuality have increased over time.[84] Moreover, the structural stigma persists through the legal ban that MSM are 'permanently prohibited' for blood donation.[85,86] Similar to the findings across the globe,[87–89] the multifaceted stigma has negatively affected Taiwanese MSM's well-being and their utilisation of healthcare and social services.[90–92]

As social venues, healthcare facilities in Taiwan are not immune to the multi-levelled HIV stigma that affects the practice of healthcare providers. One consequence of HV stigma in healthcare is that physicians may be unwilling to provide medical services to PLWH. Comparing physicians' attitudes to HIV in 1984 and 2012, Ting et al.[93] reported that, despite decreasing, more than half (54.5%) of respondents in 2012 were unwilling to provide services to PLWH. They also alerted that the majority of surgeons continue fearing contracting HIV (85.7% in 1984 to 84.6% in 2012),[93] despite governments' efforts in promoting universal precautions in medical practices.[94] A domestic study showed that HIV knowledge was positively associated with nurses' attitudes towards and willingness to provide HIV care.[95] Another consequence is healthcare providers' discriminatory behaviour against PLWH. An investigation in 2016 reported that few dental clinics in Taipei, the capital of Taiwan, were willing to provide services to PLWH owing to misconceptions of HIV transmission.[96] A recent survey of PLWH in 2020 highlights that 30% of the respondents perceived discriminatory attitudes from healthcare workers; considering the consequence of self-disclosure when seeking medical care, 71% of the respondents worried about and 11% had experienced denial of services by providers.[97]

2.2 STI and HIV healthcare organisation in Taiwan

2.2.1 Taiwan's healthcare system

Understanding Taiwan's healthcare system is conducive to identifying potential PrEP providers. Since 1995, Taiwan governments have championed the National Health Insurance (NHI), a publicly funded healthcare programme to provide universal health coverage.[98] The NHI covered the health expenditure of 99.9% of Taiwanese residents in 2019 while reimbursing 92.6% of all healthcare facilities.[98,99] Regarding affordability, in addition to a monthly premium, patients pay a fixed-fee co-payment at every visit to a healthcare facility.[100] The NHI reimburses healthcare providers on a fee-for-service basis.

While the NHI covers most disease-oriented expenditure,[101] the TCDC is the sole governmental organisation dedicated to controlling HIV/STI. Established in 1999, the TCDC is responsible for governing and subsidising treatment, control and prevention of communicable diseases. For example, the TCDC subsides the costs of ART with full coverage for the first two years and a cost-sharing mechanism with the NHI thereafter. The centre also keeps infectious diseases under surveillance through the Notifiable Infectious Disease Report System, where healthcare workers are obligated to report newly diagnosed HIV/AIDS and STIs (e.g., syphilis and gonorrhoea). Furthermore, the TCDC has conducted several initiatives for the control of HIV/STI, including HIV testing campaigns, the National PrEP Programme (Section 2.3.2) and certification of 'STI-friendly' physicians (Section 2.2.6). The TCDC and the NHI Administration are parallel organisations under the Ministry of Health and Welfare (MOHW).[102]

The healthcare delivery system in Taiwan is multi-levelled and dominated by private providers. Among all contracted facilities, 98% of clinics and 83% of hospitals are private.[103] According to Taiwanese laws, a clinic is defined as any community-based medical practice with less than nine beds; most clinics are solo practices.[99,104] Regardless of ownership, all medical care institutions are categorised into four levels: clinic, district hospital, regional hospital and medical centre (including outpatient departments).[100] These levels are correlated with the amount of co-payment, which ranges from 50 TWD (around £1.3) at clinics (i.e., private clinics and public health centres) to 420 TWD (around £10.5) at medical centres for outpatient care.[100] Considering medical referral, there is no compulsory gatekeeping system in Taiwan's healthcare. Taiwanese can access any healthcare institution without any referral if they can afford co-payments. However, most hospitals are in metropolitan areas, to which patients living outside cities have poor access.[105] Overall, clinics provide more affordable and accessible services than hospitals in Taiwan.

2.2.2 Centralised HIV healthcare

In general, Taiwan's HIV care system adopts a hospital-based model governed by the TCDC. Based on the HIV Infection Control and Patient Rights Protection Act,[78] Taiwan has provided PLWH with highly active ART and HIV-related healthcare, free at the point of access, since 1997. To establish a nationwide HIV care system, the MOHW proclaimed the Principle of Designated Medical Institutions for HIV in 2009.[106] Consisting of hospitals, the designated institutions are accountable for screening, diagnosis and treatment for HIV as well as promoting prevention. In 2009, the TCDC issued a further regulation that defined ART prescribers as infectious disease (ID) specialists or rheumatologists with experience in HIV care at designated institutions.[107] Aiming to improve PLWH's access to ART, the TCDC has authorised local pharmacies to deliver refillable prescriptions since 2016, followed by piloting private clinics in delivering HIV-designated care in 2019.[108] As of October 2020, the nationwide care system has expanded into 81 hospitals, one clinic and 54 pharmacies.[108]

To improve PLWH's adherence to ART and their retention in healthcare, the TCDC incorporated hospital-based HIV case managers (HCMs) into the countrywide HIV care system in 2007. Designated hospitals are requested to hire at least one HCM to improve the health outcomes of HIV-positive individuals.[107] While supporting PLWH's treatment adherence, needs for healthcare and psychosocial well-being, HCMs are also responsible for HIV surveillance by reporting the treatment progress (such as CD4 counts and viral loads) of PLWH to the TCDC.[109] Although Huang worries that HCMs may reinforce 'moral quarantine'[83(p390)] on PLWH for reaching the global targets, studies have shown that Taiwan's HCMs improve the health conditions of PLWH by improving virological suppression, retention in healthcare and reducing negative impacts of HIV stigma.[110,111]

2.2.3 Haphazard STI services

Compared to the centralised system of HIV care, STI healthcare in Taiwan is not integrated but distributed across all levels of healthcare facilities. Unlike HIV, there are no specific laws designating facilities or physicians for STI service provision. As STIs consist of a plethora of diseases with great diversity in clinical presentations, one can consider Taiwan's STI healthcare as organ-focussed, bifurcated by sex/gender binary and governed by various independent specialities. When suspecting STIs after sexual exposure, the public commonly seek healthcare based on the location of symptoms, such as dermatologists for unspecified skin lesions, colorectal surgeons for anal discomfort and gastroenterologists for undetermined hepatitis. Also, gynaecologists are regarded as experts in treating women's STIs, whereas urologists have long traditions of providing STI services to men. Practising at

hospitals, ID specialists deliver STI services to PLWH or patients with complicated STIs whom other specialists referred.

STI diagnosis and treatment services are therefore distributed across many and diverse healthcare providers. This segmentation of STI services in Taiwan may partially explain why the public perceive them to be of inconsistent quality and the difficulties in curbing the epidemics of syphilis and gonorrhoea.[26]

2.2.4 Organisation of physicians

With increasing medical advancement and disease complexity, physicians in Taiwan have become highly specialised by joining speciality-based medical societies. Taiwan's medical societies comprise 23 legally recognised specialities as well as several unofficial but self-regulatory sub-specialities. For example, infectious diseases and gastroenterology are sub-specialities within their respective organisations, but both specialists are legally recognised as internal medicine physicians rather than their sub-specialities. According to Larson,[112] medical societies exemplify professional groups that consolidate physicians' social status, public trust and autonomy by certifying members' specialised knowledge. Unger et al.[113] also underline the functions of medical societies in four dimensions: regulating clinical practices among members; enhancing physicians' autonomy and ethics; protecting members' financial interests in medical markets and facilitating continuing education.

The difference between the HIV and STI healthcare systems may reflect the contrasting dynamics of the corresponding medical societies. In general, HIV care providers are governed by the Taiwan AIDS Society (TAS), most of whose members are ID specialists. Commissioned by the TCDC, TAS publishes and updates national clinical guidance on HIV treatment and prevention while delivering continuing education related to HIV and AIDS. Whereas the Taiwan AIDS Nurses Association certifies HCMs, TAS is not in charge of speciality certification. It plays a critical role in Taiwan HIV policymaking by leading an epistemic community, defined by Haas as 'a network of professionals with recognized expertise and competence in a particular domain'.[114(p3)] Consisting of ID specialists, other healthcare workers (e.g., nurses and pharmacists), HCMs and PLWH communities, the TAS-led HIV epistemic community actively participates in and contributes to policies related to HIV and PLWH.

By contrast, STI care in Taiwan involves multiple medical societies without specific specialisation programmes on either STIs or sexual health. There is nothing comparable to, for example, the UK's speciality training in community sexual and reproductive health.[115]

Taiwanese medical societies may independently contract with the TCDC to execute programmes on STI prevention and professional education. Overall, the medical associations for HIV care form an integrated community under designated laws and regulations, whereas those involved in STI services are siloed with limited collaboration.

2.2.5 Medical professionalism in HIV/STI healthcare

According to Taiwan's Physicians Act,[115] physicians are the sole legitimate prescribers among all types of healthcare workers. Such legitimacy underlines physicians' core role in STI/HIV service delivery, from prescribing antibiotics to patients with STI to delivering PrEP services to key populations. Therefore, understanding medical professionalism and how physicians follow professional codes (or not) in service delivery are pertinent to my inquiry.

Medical professionalism plays a role in physicians' prescribing behaviour by sculpturing their daily practices and relationships with patients. While there is no gold standard definition of medical professionalism, Cruess and Cruess[116] argue that professionalism builds upon 'a contract between medicine and society' that assumes physicians are altruistic and moral. When their medical expertise functions effectively in healthcare delivery, physicians are granted autonomy, prestige and high social status. On the other hand, physicians' misconduct and increasing healthcare demands in the last decade have challenged the public's trust in physicians. Rosen and Dewar[117] have highlighted four principles to understand the concept of medical professionalism in the 21st century:

- a calling or vocation linked to public service and altruistic behaviour;
- the observance of explicit standards and ethical codes;
- the ability to apply a body of specialist knowledge and skills;
- and a high degree of self-regulation over professional membership and the content and organisation of work.

Taking PrEP prescribing as an example, physicians exhibiting medical professionalism may dedicate themselves to providing publicly funded PrEP to populations at risk of HIV, apply knowledge and communication skills to stigma-free consultations and abide by regulations from affiliated medical societies.

The precise expression of medical professionalism reflects the culture and societal values of the place where physicians practise. In Western societies, the tradition of the Hippocratic Oath results in physicians being viewed as healers and also now as followers to regulations set by national medical authorities.[116] For example, the Royal College of Physicians in the UK states that physicians need to be integrated, compassionate, altruistic, and striving for

excellence in teamwork environments.[118] The Accreditation Council for Graduate Medical Education (ACGME) in the US describes professionalism as a 'core competency'[119(p3)] that physicians should demonstrate accountability in professional conduct, exhibit cultural competency with humanity, and strive for continual growth at personal and professional levels while retaining their own health.[120] In Taiwan, the concept of medical professionalism has integrated the ACGME's definition with social responsibilities rooted in Confucianism. A recent review characterised cultural differences in professionalism between Western states and East Asian countries like Taiwan.[121] The former emphasise social disparities and the rights of patients, whereas the latter focus on responsibility, duties and respect for others.

Scholars have developed conceptual frameworks to elucidate medical professionalism. Using the house as a metaphor, Arnold and Stern[122] argue that professionalism is grounded on three fundamental elements (knowledge, communication and ethical/legal considerations) and pillared with four attributes: excellence, humanity, accountability and altruism. Inspired by this schematic framework, Ho et al. highlighted integrity as the cornerstone of medical professionalism in Taiwan (Figure 2.2).[123] Two studies emphasise the importance of integrity as a personal virtue that harmonises with familial and societal values.[123,124] Hence, Taiwanese societies may expect physicians to maintain professional ethics (醫德 yī dé in Traditional Chinese) by balancing personal benefits, patient-physician relationships and social responsibilities. Taking PrEP service as an example, one can imagine that Taiwanese physicians would consider potential benefits from PrEP prescribing, patient management and societal values of PrEP in their decision-making of service delivery.

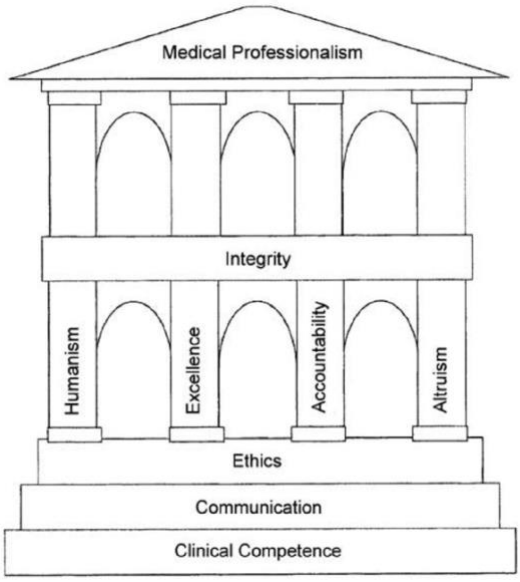


Figure 2.2 A conceptual framework for medical professionalism in Taiwan
Source: Ho et al.[123] (a modification to Arnold and Stern's framework).[122(p19)]

Research into how Taiwanese physicians enact professionalism is limited to medical students[125,126] and hospital-based physicians.[127] Two studies revealed that healthcare workers' professional attitudes to PLWH are positively associated with continuing education.[128,129] However, both were limited to physicians with experience in HIV care (i.e., hospital-based physicians). Chang's study of cosmetic surgery highlighted the re-professionalisation of cosmetic physicians outside hospitals through collaboration between medical societies and the cosmetic industry.[130] Nevertheless, the nature of medical cosmetics (and societal perceptions of it) are distinct from those of HIV/STIs, which are socially unfavourable and tainted by multiple stigmas. In practice, physicians working outside hospitals are not obliged to specific codes of professionalism but regulated by affiliated medical societies and laws. For example, to renew their medical license, physicians require 12 credits (equivalent to 12-hour training) every six years for improving professional quality and ethics. The professional credits include training in infection control and sex/gender issues, but physicians may prioritise learning other health topics than HIV/STI care. To sum up, there is limited understanding of whether and how professionalism may determine the needs of physicians for delivering PrEP and other STI/HIV care in Taiwan (or elsewhere).

2.2.6 Sexually-transmitted-infection-friendly physicians programme led by the TCDC

Most Taiwanese with STIs have unmet needs as they feel embarrassed at accessing healthcare facilities for timely diagnosis and treatments.[26] To improve the control of STIs and the quality of STI care, since 2010, the TCDC has initiated a training programme certificating 'STI-friendly physicians' (STIPs).[26] This programme aims to educate and guide physicians about STIs and HIV, including diagnosis, treatment, case management, non-discriminatory consultation skills and partner notification. To obtain certification, physicians need to complete six-hour face-to-face or online training and correctly answer at least 60% of the questions in the exam. The TCDC has commissioned the process of certification to those medical societies with STI interests. Three speciality societies (i.e., the Taiwan Association of Family Medicine, the Taiwan Association of Obstetrics and Gynaecology and the Taiwan Urological Association) regularly hold one to three training cycles per year. Certificated doctors are recommended by the TCDC as STIPs with a six-year validity;[26] their names and practice locations are publicly listed on the TCDC's website as a directory for individuals seeking STI care.[30]

2.2.7 Community-based sexually transmitted infection friendly physicians (CSTIPs)

This thesis is concerned with STIPs practising in community settings (i.e., outside the hospital), whom I call 'Community-based STIPs' (CSTIPs). As of June 2019, CSTIPs accounted for 58% (698/1203) of all STIPs. The most common specialities among CSTIPs are family medicine (70%), gynaecology (12%), urology (8%), followed by internal medicine (2%) and paediatrics (2%). CSTIPs' services cover the majority of the administrative divisions in Taiwan, practising in 90% (213/233) of administrative divisions with STI care facilities and in 58% (213/369) of all divisions in Taiwan. As described in Section 1.4, CSTIPs are key providers in Taiwan's sexual health services based on their geographical spread, 'high street' accessibility and range of clinical skills.[131]

2.3 PrEP for HIV prevention in Taiwan

PrEP services in Taiwan are provided through both government-led and private programmes. A timeline of PrEP implementation is presented in Figure 2.3. Published by TAS in 2016, the Taiwan national PrEP guideline recommends the use of daily oral PrEP for HIV-negative MSM, transgender women and people in relationships with HIV-positive partners.[132] Pricing at 345 TWD (around £8.5) per tablet, Truvada is the only approved brand of PrEP in Taiwan.[133] Users may also access unlicensed generic bioequivalent PrEP through private self-paid programmes (described in Section 2.3.3).

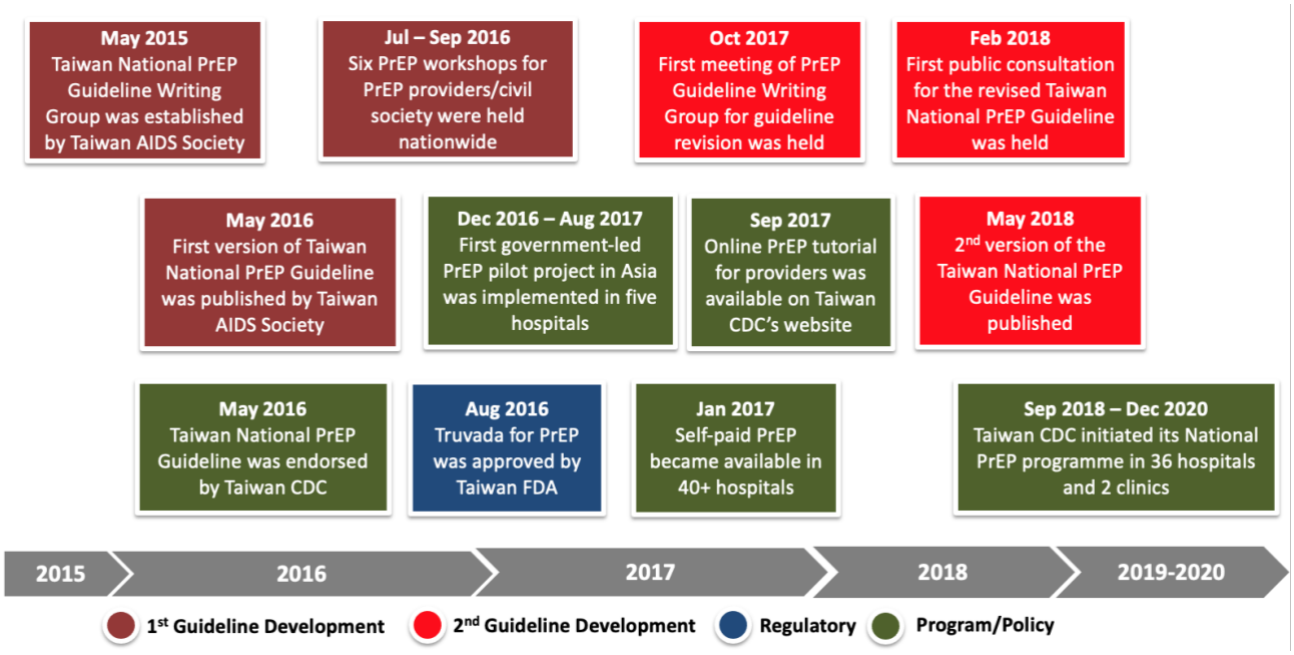


Figure 2.3 The timeline of PrEP implementation in Taiwan

PrEP: Pre-exposure prophylaxis; FDA: Food and Drug Administration; CDC: Centers for Disease Control. Source: Adapted from Li et al.[132]

2.3.1 The TCDC Pilot PrEP programme

Realising PrEP is unaffordable for most potential users, from November 2016 to August 2017 the TCDC initiated a government-led pilot programme targeting 1000 at-risk individuals.[50,134] Individuals interested in taking PrEP must visit ID specialists at one of five designated medical centres to assess their risk for HIV and initiate PrEP based on the Taiwan PrEP guideline. If eligible, participants took PrEP daily for 12 months with quarterly clinic visits. The TCDC covered the costs of up to 105 of 365 PrEP pills per person, assuming that users took one tablet daily for one year. Although the pilot was promoted to gay and bisexual men communities, only a third (322/1000) of the available spaces were filled.[29] In addition, 6% of those enrolled (20/322) withdrew from the pilot. The TCDC attributed the low uptake to the following reasons: unaffordability of out-of-pocket PrEP (i.e., pilot users must pay approximately £2210 for the 260 unsubsidised Truvada pills), difficulty in accessing the five hospitals (all located in cities), a lack of awareness of PrEP and low self-perceived risks of HIV.[29,135]

2.3.2 The TCDC National PrEP Programme (National Programme)

Learning lessons from the pilot, the TCDC initiated its National PrEP programme (National Programme) in 2018. From September 2018 to December 2020, the National Programme provided 2000 people with free Truvada for 12 months (illustrated in Figure 2.4).[12] It also acknowledged the use of event-driven PrEP, which has been recommended by the 2018 revision of the Taiwan PrEP guideline for MSM and transgender women.[12] Subsequently, of the 2000 places on the Programme, 1000 were designated for HIV-negative adults in serodiscordant relationships who can access daily PrEP, and 1000 were for young MSM and transgender women (between 18 and 30 years) who can choose daily or event-driven PrEP.[29] Those who wished to continue taking PrEP after the 12th month could not re-enter the Programme but seek PrEP from other sources.

With fully subsidised PrEP pills, eligible participants pay around 800 TWD (equivalent to £20) monthly to access PrEP services. Enrolled participants can register for PrEP care with any of 110 infectious disease specialists at 36 hospitals or with two further physicians based at two community-based clinics.[29] In addition, users can access mental health and harm reduction services with physicians' referrals.

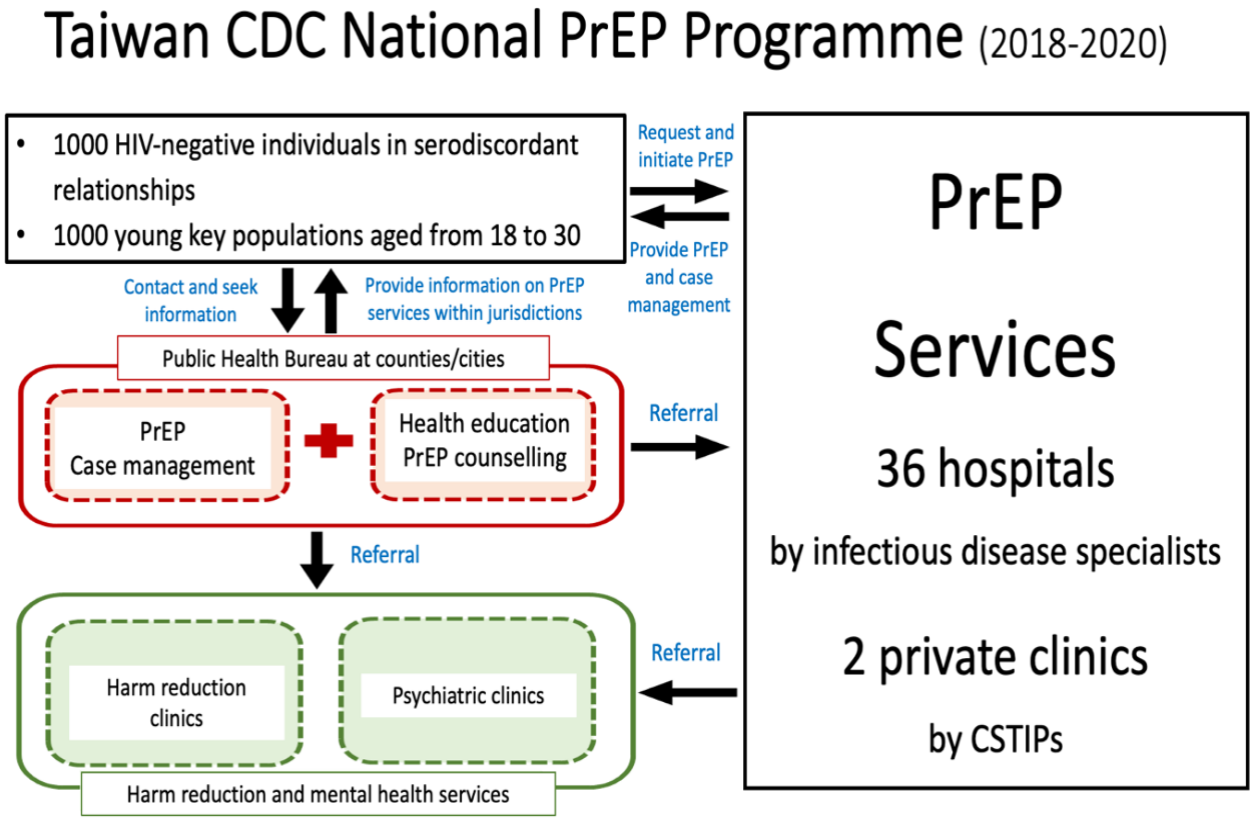


Figure 2.4 A schematic overview of the Taiwan CDC National PrEP programme

CDC: Centers for Disease Control; PrEP: Pre-exposure prophylaxis; CSTIPs: Community-based sexually-transmitted-infection-friendly physicians. Key populations are defined as men-who-have-sex-with-men and transgender women. Source: Taiwan Centers for Disease Control.[29]

Notes:

The TCDC ran its National PrEP Programme from September 2018 to December 2020.

PrEP services in this programme included:

- Health education for the prevention and treatment of HIV and other STIs
- Assessment and referral of substance abuse behaviour
- Assessment and referral of mental health conditions
- Assessment of and consultation on PrEP eligibility (including HIV laboratory tests)
- PrEP prescription with quarterly clinical follow-up
- HIV/STI screening and treatment
- Provision of self-care material and referral to harm reduction and psychiatric services when necessary

2.3.3 Other PrEP services in Taiwan

Although private PrEP programmes are outside the focus of my thesis, their existence impinges on my topic. Outside the National Programme, two private (i.e., non-governmental) self-paid PrEP programmes exist in Taiwan. The first is the Patient Assistance PrEP programme (PAP) run by Gilead, the pharmaceutical company manufacturing Truvada. Adapted from the company's PrEP Medication Access programme in the US,[136] PAP offers Taiwan users a 67% discount on the PrEP costs by promoting a package of 'buy one bottle and get two bottles free' and door-to-door PrEP delivery.[137] The second private model is the Provider-Assisted PrEP Access (PAPA) programme. Initiated in 2017, PAPA is facilitated by an international coalition between Taiwanese and Thai physicians to increase users' PrEP access from verified overseas sources providing both patented and generic PrEP.[138]

Despite not being regulated by the TCDC, both private models still require users to obtain PrEP prescriptions from TCDC-verified physicians. In addition, private models cast greater financial burdens on PrEP users than the National Programme by charging two to five times out-of-pocket expenses.[137] Due to the issues of affordability, I argue that private programmes may not replace but complement the National Programme for the roll-out of PrEP in Taiwan.

2.3.4 Increasing demand under limited supply of PrEP services

Seven months after launch, the National Programme had served over 1200 MSM,[12] quadrupled the number in the pilot. Although the roll-out of the National Programme seems successful, I argue that the current hospital-based service model may not maximise the impact of PrEP for two reasons.

For one thing, demands for PrEP will soon exceed the capacity of current PrEP providers. Although there are no official data on the population size of MSM in Taiwan, Yang and Lee's 2016 cohort study estimated MSM at 2.85% of adult males,[139] which in December 2020 was around 272,000 adult MSM.[140] Ku et al.'s studies found that the proportion of MSM willing to take PrEP increased from 24% in 2017 to 30% in 2019, together with a tripled percentage of PrEP users from three to ten per cent.[135,141] Hence, the 2000 places on the National Programme may only satisfy the PrEP needs of fewer than five per cent of Taiwanese MSM.

For another, the hospital-oriented PrEP services may heighten the inequity in users' access to PrEP by geography. Of all 36 hospitals providing PrEP services, only three are in Eastern Taiwan, the most mountainous and least urbanised region where an estimation of 7800

MSM reside in 2020 (assuming the prevalence rate of MSM at 2.85% across Taiwan).[139,142] Hence, individuals who cannot afford the costs of time and money to visit hospitals will not access and benefit from PrEP services. In summary, there is an urgent need to expand PrEP service capacity in Taiwan. Without exploring and establishing the possibility of delivering PrEP services outside hospitals, TCDC will not maximise the effectiveness of PrEP on all individuals at risk for HIV.

2.4 The potential of CSTIPs for expanding PrEP access in Taiwan

2.4.1 Evidence on decentralised models of PrEP services

As physicians are the only legitimate PrEP providers in Taiwan, I define the *decentralised* PrEP service as the task-shifting of service delivery from hospitals to private clinics and public health centres, both of which constitute Taiwan's primary healthcare system.

Studies outside Taiwan have demonstrated the feasibility and impact of PrEP services led by non-physician providers. Examples include services led by pharmacists in Kenya and USA[143,144] by nurses in Australia, Canada and the US[145–148] and by key population members themselves in Thailand and Vietnam.[15,19] Two reviews have also demonstrated the accessibility, affordability and financial sustainability of decentralised PrEP services globally and in Asia-Pacific.[149,150] However, while various PrEP delivery models and types of providers have been established, my DrPH thesis focusses on non-hospital-based physician-led PrEP services that are delivered by CSTIPs.

2.4.2 Sexual health physicians as PrEP providers

I propose that CSTIPs have great potential to deliver optimal PrEP services to Taiwanese MSM. I offer three justifications in the following paragraphs.

Firstly, given STIs are indicators of condomless sex, CSTIPs frequently see patients at risk for HIV who can benefit from PrEP. Based on their certificated training, they are presumably familiar with taking a sexual history from, ordering laboratory tests for and diagnosing patients with STIs. Moreover, these doctors can solve the 'purview paradox' in PrEP service delivery observed by Krakower et al.[151] The paradox is that neither HIV care specialists nor primary care physicians (PCPs) regard themselves as suitable providers of PrEP. In studies asking physicians their perceived optimal setting for PrEP services, HIV specialists argue that they rarely see HIV-negative individuals. At the same time, PCPs claim that they are unfamiliar with PrEP, uncomfortable taking sexual histories from patients or not seeing patients at risk for HIV.[151,152] Conversely, two reviews have emphasised that physicians

experienced in diagnosing and treating STIs are suitable PrEP providers.[32,153] In Taiwan, this corresponds to the role of CSTIPs. Studies from the US and Australia have also demonstrated that community-based sexual health clinics can provide sustainable and feasible PrEP services to MSM.[154–156]

Secondly, compared with hospitals, community-based clinics are more accessible and affordable (i.e., lower co-payment) to potential PrEP users in Taiwan. Three local studies have stressed that difficult access to and high costs of PrEP services are the main barriers to MSM's PrEP uptake.[135,141,157] Scholars also suggest that pluralistic and differentiated models for PrEP delivery may help increase the overall accessibility of PrEP services.[69,70,158]

Thirdly, CSTIPs can expand the overall capacity of Taiwan's PrEP care by shifting the workload from hospitals to community-based clinics. The time-consuming nature of PrEP services and anticipated user growth have challenged healthcare organisations' capacity, including financial resources, workforce and operational infrastructure. [159] [160] For instance, providers from seven countries in the Global South have expressed concern about whether their over-stretched health system can meet increasing demands from PrEP users.[161] Countries in the Global North (e.g., Ireland and Scotland) also reported that PrEP care has imposed work burdens on sexual health providers.[162,163]

In summary, I argue that CSTIPs could provide PrEP beneficiaries with affordable, accessible and sustainable services which integrate the prevention and treatment of HIV and other STIs. As described in Section 1.4, the fact that 13 CSTIPs delivered self-paid PrEP services and two joined the National Programme in 2019 has vindicated my argument.

2.4.3 Evidence on the needs of non-hospital-based physicians for PrEP prescribing

In the last decade, a growing body of literature has investigated the unmet needs of physicians for PrEP service delivery. Most empirical studies of community-based physicians (e.g., PCPs, family physicians and general practitioners) are conducted in North America, Europe and Australia. To ensure the coherence of my thesis, I here briefly review the scope of needs of community-based physicians to prescribe PrEP. I organise these needs using the three primary 'sources of behaviour' in the COM-B model: capability, opportunity and motivation.[35] I describe COM-B more fully in Section 3.3.1.

The first area of need arises from physicians' limited capabilities to deliver PrEP services. Several studies have identified a lack of PrEP knowledge among physicians in various contexts, such as French family physicians, Dutch sexual health doctors and American

PCPs.[164–166] While two US studies suggest that more physicians have heard of and prescribed PrEP over time,[167,168] Pleuhs et al. argue that few PCPs would perceive themselves as knowledgeable in PrEP prescribing.[62] The lack of knowledge includes: being unaware of national PrEP guidelines,[168] unfamiliar with the indications for PrEP,[164] suspicions of the effectiveness of PrEP against HIV (both in trials[169,170] and real-world settings after the WHO's recommendation[171]) and misunderstanding PrEP as post-exposure prophylaxis.[172]

In addition to knowledge, physicians may lack the abilities and skills required for PrEP services. Studies across Australia, Germany and the US have addressed physicians' perceived difficulties in identifying patients at risk of HIV.[172–174] Concerns about communication skills and cultural competencies for serving key populations have been also highlighted as unmet needs of non-HIV-specialists.[175–178]

The second area of need emerges as physicians lack opportunities for prescribing PrEP to beneficiaries. Several studies have reported that the high cost of PrEP makes prescribing difficult due to issues of affordability;[169,179–181] Nevertheless, two studies criticise that such concerns may result from physicians' unfamiliarity of programmes and insurance plans that offset against the expenses.[165,182] Thus, lack of knowledge limits opportunities as well as capabilities. For unengaged physicians, lack of opportunity is associated with few patient requests. A Canadian study finds out that physicians are more willing to prescribe PrEP if they have received patients' requests.[169] Issues of time management are also of concern. Providers in Australia, Kenya and the US stressed that their work is fully occupied with non-PrEP services, with limited time allocated for each consultation.[174,177,183] This is supported by studies highlighting sexual health service capacity overload at organisational levels.[153,161,184]

Another structural challenge to opportunities comes from a limited supply of ART. Given that the ingredients of PrEP are used for treating HIV, the need for HIV prevention may compete with HIV treatment in resource-limited settings. A Peruvian study points out that providers may prioritise treating PLWH instead of prescribing PrEP to HIV-negative users due to the scarcity of ART.[185]

In addition, opportunities can be missed due to PrEP stigma (mentioned in Section 2.1.2). Studies in Australia, Tanzania and the US have revealed that some physicians portray PrEP users as promiscuous, risk-seeking individuals, resulting in discriminatory attitudes and behaviour.[57,61,174] Calabrese et al. also point out that providers' age biases and disapproval of condomless sex may preclude their PrEP prescribing.[65]

The third and perhaps the most expansive area of need is the lack of motivation for PrEP prescribing. Studies have indicated that physicians may be unwilling to prescribe PrEP based on three specific reasons. Firstly, physicians are concerned about the potential negative consequences of PrEP at individual and population levels including: the side effects of PrEP that may affect users' health (i.e. slight decrease in renal function and bone mineral density);[151,166] users' adherence to PrEP as well as retention in PrEP services;[170,179,186,187] and risk compensation in sexual behaviour (i.e., PrEP users will have more condomless sex);[63,182,188,189] the creation of drug-resistant HIV strains;[64,190,191] and increasing transmission of other STIs due to users' risk compensation. While two reviews have shown that PrEP-induced drug resistance of HIV is rare,[192,193] whether or not PrEP facilitates higher STI transmission is inconclusive. The increase of STI cases among PrEP users can be explained by either a casual association mediated by increased condomless sex or more individuals tested for STIs in PrEP care.[192,193] The latter ultimately benefits the global control of STIs as more (a)symptomatic individuals receive timely diagnosis and treatment.

Lack of motivation may arise from providers' discomforts from PrEP prescribing. Such emotional stress may be related to limited knowledge of PrEP,[165,194] frustrating discussions on condom use with patients[195] and personal biases against patients asking for PrEP.[65] Providers may also be unmotivated due to little reward from PrEP service provision. Physicians in a German study argue that the lack of reimbursement from PrEP services does not satisfy the financial needs for clinical operations.[172]

To date, only two studies have focussed on physicians' PrEP needs in East Asia. Cui et al.[196] reported that HIV care specialists in China may be unwilling to provide PrEP services due to the lack of clinical guidance and concerns about users' PrEP adherence. The issue of poor adherence has been identified as a concern of Thai healthcare providers in Wisutep et al.'s survey.[197] Neither study has specifically addressed the needs for PrEP prescribing of physicians working outside hospitals.

2.5 Evidence gaps addressed by this thesis

The evidence reviewed above suggests a pertinent role for CSTIPs in delivering PrEP services and contributing to Taiwan's HIV/STI healthcare. Informed by the literature and background knowledge, I aim to fill three gaps in PrEP implementation research. Firstly, while studies have identified various needs of physicians for PrEP prescribing, what physicians require to provide PrEP services in Taiwan remains largely undescribed. Secondly, knowledge, high costs and belief in consequences have been identified as

common needs of physicians in various countries, but few studies have explored other potential determinants of behaviour, such as physicians' perceived confidence, professionalism and the dynamics with other healthcare workers. Moreover, there are no studies in Asia on the implications of PrEP stigma for providers' capability, opportunities and motivation to provide it. There is an urgent need to generate empirical evidence on how PrEP stigma, together with cultural and social contexts, may hinder the scale-up of PrEP implementation in Taiwan. Lastly, there is a theoretical gap in the literature of PrEP research. To my knowledge, no published studies have employed the COM-B or the TDF as theoretical foundations to investigate the needs of physicians for PrEP prescribing. In summary, the thesis aims to advance knowledge by generating geographical, cultural and methodological evidence on the unmet needs of CSTIPs for PrEP service provision.

Chapter 3 Theoretical Underpinnings and Applications

3.1 Research philosophy of the study

I took a pragmatic perspective as my research paradigm. The term 'paradigm' was used by Khun[198] to signify the worldview researchers adopt to guide the processes of their studies.[199] In general, pragmatic researchers hold three distinctive principles in practice.[200] Ontologically, they embrace the possibility that reality can be explained by a single phenomenon or from multiple perspectives. Epistemologically, people focus on 'what works'[201(p245)] and 'solutions to problems'[200(p48)] in real-world scenarios. Methodologically, acknowledging that all methods are imperfect, pragmatists emphasise the questions to be answered instead of which methods to be adopted. To answer research questions, they take pluralistic approaches to collecting data and think both inductively and deductively. In summary, the pragmatic paradigm could increase the rigour of my study by building a solid philosophical foundation.

3.2 Defining the service provision need of physicians: Inadequate models

A clear definition of needs is fundamental to assessing physicians' needs for PrEP prescribing. The term 'need' has been widely applied across disciplines, but a universal definition does not exist. Watkins and Kavale summarise the connotations of need in the literature as five categories: objects (things and commodities), goals, deficiencies, gaps and physical/psychological conditions for human beings to sustain lives.[202] In public health research, needs can also be understood as gaps between the current and ideal status, such as unavailability of specific treatments, lacking access to healthcare services or underperformance of services. Synthesising a number of theories, Weatherburn et al. classify definitions of needs into three schools of thought: a complete perspective, an economic perspective and a subjective perspective.[203]

The complete perspective of needs aims to provide a picture of the requirements of human beings for a good (or decent) life. Perhaps the most well-known example is Maslow's Hierarchy of Needs that defines five basic human needs.[204] Starting from physiological necessities for survival, individuals satisfy their needs in the order of safety, belonging and esteem before aiming for self-actualisation as the ultimate goal. In his later work, Maslow further expands the hierarchy into eight types of needs with a dichotomy of 'higher needs' and 'lower needs' to explain human motivation.[205(p97)] While setting foundations for psychological research for decades, the model has also received criticism from scholars due to its rigidity and inapplicability.[206–208] Specifically, Maslow's model assumes a clear

boundary between each type of needs. However, needs are often overlapping. The meaning of needs is value-oriented and varied in different contexts.[208] Also, his hierarchical heuristic implies a linear process of needs satisfaction, which cannot be generalised to every individual. For instance, people may have earned self-esteem despite the fact that their needs for belonging remain unsatisfied. To date, Nussbaum (and Venkatapuram in the field of global health) have advanced this perspective of needs by articulating the capabilities of human beings.[209,210]

Contrasting with psychologists' and philosophers' interpretations of needs, scholars taking economic perspectives argue that needs are objective and comparable. One exemplar model is the Theory of Human Needs by Doyal and Gough, which postulates 'physical health' and 'autonomy' as the fundamental needs of individuals.[211(p49)] The two basic needs are further supported by 11 intermediary determinants that they posit as universally applicable characteristics irrespective of contexts. They also contend that opportunities for social engagement and personal skills are key attributes in an individuals' decision-making autonomy. The model employs a positivist approach to defining needs but provides neither operational definitions of needs nor elaborations on the ideal conditions of the proposed basic needs. Thus, its applicability in public health research is limited.[212] This objective model is also challenged by other scholars considering needs as a concept with multiple interpretations in societies.[213]

Also through the lens of health economics, Culyer defines needs as individuals' 'capacity to benefit' from healthcare services.[214,215(p278)] He argues that interventions or services in healthcare should be present for the needs to be measured. Nevertheless, what is beneficial and how to measure benefits may be subject to authorities, such as expert groups and governments. In other words, Culyer's definition may fail to reflect the complexity of needs in healthcare that involve multiple stakeholders.[212] Despite highlighting the relationship between capacities and needs, his interpretation is tailored to service users or patients rather than service providers.

The third perspective on needs emphasises individual subjectivity. Acknowledging the power dynamics among individuals, authorities and societies, Bradshaw proposes a taxonomy of needs (i.e., normative, felt, expressed and comparative) from sociological aspects.[216] Normative need arises from the desirable conditions defined by experts and authorities. Those who do not reach desirable conditions are considered people in need. Individuals themselves define both felt need (perceptions of wants without action) and expressed need (when felt need develops into explicit action). Bradshaw further equates expressed need

with demand for services. Lastly, comparative need surfaces when comparing the services received by populations in similar conditions. Those who cannot access services like their counterparts are defined as the population in need. Bradshaw posits that the real need emerges when the four types of need overlap.

Scholars from organisational science also articulate needs tailored to service providers. Kaufman defines needs as 'a gap between current results and desired or required results' in project performance.[217(p94)] Inspired by the social-ecological model,[218] he further argues that needs assessments should consider needs at societal and organisational levels. Kaufman's recognition of needs among multi-levelled stakeholders is echoed by Gupta, who stresses that needs assessments comprise 'analysis, collaboration and negotiation to identify and understand gaps in learning and performance and to determine future actions'.[219(p18)] In practice, service providers have their own needs, such as improving the service satisfaction rate of users and increasing the supply of goods for customers' demand.[202]

Although theories from the subjective perspective are better tailored to the needs of service providers, critical limitations exist. Asadi-Lari et al.[220] point out that Bradshaw's typology[216] does not consider cost control and service capacity, both of which are critical to understanding the needs of providers for healthcare provision. Admittedly, Kaufman's definition expands the inquiries about needs from services users to other actors in organisations and societies. However, I contend that his model may overly rely on subjective judgements without reflecting theories of needs in psychology and sociology.

I argue that the needs of providers have not been sufficiently elaborated in public health research literature. Studies of physicians' prescribing behaviour have applied a diverse range of models,[221–224] including Persuasion Theory,[225] the Theory of Planned Behaviour[226] and Social Power Theory.[227] Considering PrEP provision, few in literature have established theoretical underpinnings of physicians' needs.[32,228–230] Two studies suggest that psychological theories (e.g., the Theory of Planned Behaviour and the Theory of Reasoned Action) can be useful in predicting providers' PrEP prescribing behaviours.[228,229] Walsh et al.[228] argue the Information-Motivation-Behavioural Skills model[231] can partially explain why primary care providers in the US do (not) provide PrEP services. Although Walsh et al.'s argument may provide theoretical insights into PrEP prescribing behaviour, their parsimonious model and single-country focus may contribute little to the understanding of the diverse needs of physicians. Two reviews stress there has been no comprehensive framework for researchers to investigate physicians' behavioural needs and to design context-specific interventions.[232,233]

To sum up, I argue that current theories of need inadequately serve as theoretical underpinnings of my study. A systematic, applicable and theory-informed framework is deemed necessary for me to measure the needs of CSTIPs.

3.3 Theoretical framework: The COM-B/TDF model

To capture the entire range of needs to be measured in a questionnaire survey, this study applies a combination of two theoretical frameworks: the capability–opportunity–motivation–behaviour (COM-B) model and the Theoretical Domains Framework (TDF).[35,36]

3.3.1 The COM-B model

The COM-B model is a comprehensive behavioural change theory invented by Michie et al. in 2011.[35] It encompasses three interconnected sources of behaviour: capability, opportunity and motivation (Figure 3.1). According to Michie and colleagues,[35] human behaviour will occur once all three conditions are satisfied: when people are (1) physically and psychologically capable of the target behaviour, (2) granted opportunities physically and socially and (3) motivated in a reflective or automated fashion. Moreover, the three components and target behaviour are mutually affected: while the synergy of all three components (or six sub-components, see Figure 3.1) results in specific behaviour, the action itself can affect the extent of capability, opportunity and motivation.

I select this model as my theoretical foundation for three reasons. Firstly, the COM-B has established wide applicability in analysing healthcare providers' adoption of evidence-based practices. It has been successfully used to design interventions to change providers' behaviour. Thus, it matches the target behaviour on which my thesis centres: CSTIPs' PrEP service provision in Taiwan. Secondly, this model can inform public health policymaking by transforming behavioural diagnoses to evidence-based interventions and policies through its extensions (e.g., the Behaviour Change Wheel[35] and the Behaviour Change Technique Taxonomy[234]). The feasibility and potential of the COM-B in identifying what is required for PrEP prescribing behaviour serve my study aim. Thirdly, as the COM-B captures the diversity of service provision needs, I define 'capability, opportunity and motivation' as the needs of physicians. Specifically, physicians need to be capable and motivated to deliver PrEP services and have opportunities to do so.

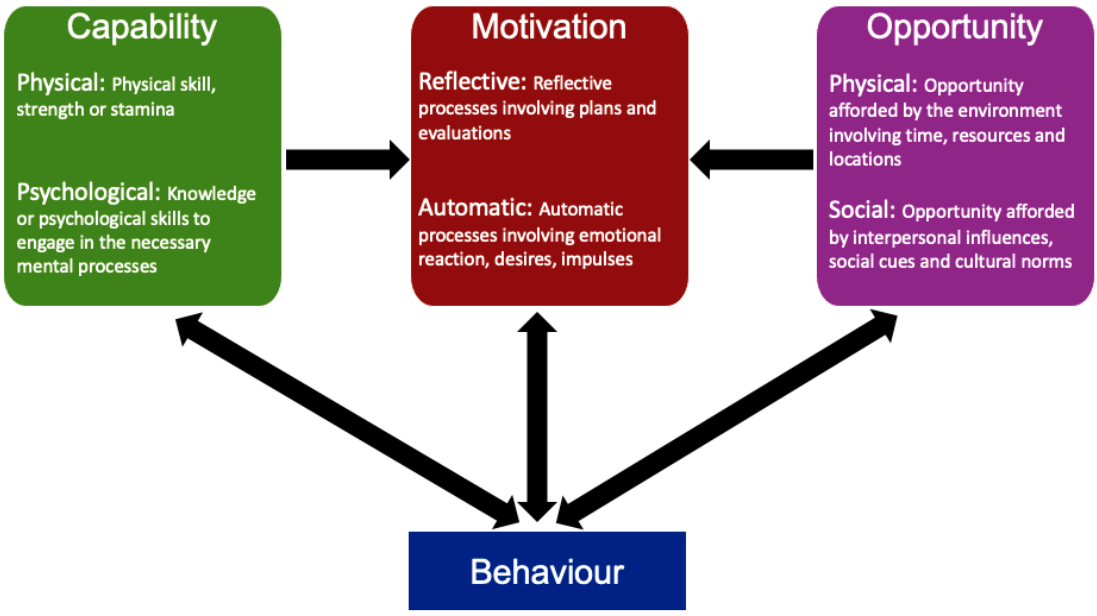


Figure 3.1 The capability–opportunity–motivation–behaviour (COM-B) model
Source: Adapted from Michie et al. [35,37] with definitions of six sub-components

3.3.2 The Theoretical Domains Framework (TDF)

Derived from 33 behaviour change theories, the TDF serves as a systemic framework to explore the diverse needs of healthcare providers as well as an elaboration of the COM-B. To facilitate more theory-informed behaviour change interventions, Michie and her team developed the TDF in 2005 through a six-stage consensus-building process that generated 12 theoretical domains (defined as 'a group of related theoretical constructs').[235] In 2012, this framework was further refined into a second version with 14 validated domains.[36] Table 3.1 presents definitions of the 14 domains of the TDF and the constructs they include. The TDF alone has been used for understanding service providers' perceived barriers to standardised care, such as evidence-based prescribing guidelines, screening of human papillomavirus infection and support of patients' medication adherence.[236–239] Also, its domains have been regarded as determinants of behaviour by behavioural scientists.[240] Scholars have established plausible linkages between the Behaviour Change Techniques and the Mechanisms of Action that includes TDF domains.[241,242] Moreover, several studies have applied the TDF to designing interventions for improving care quality,[243] such as appropriate polypharmacy[244,245] and fidelity to clinical guidelines (e.g., stroke triage and infection control).[246,247]

Table 3.1 Definitions of domains and constructs in the Theoretical Domains Framework

Domain (Definition)[α]	Constituent Construct	Example questions[β]
1. **Knowledge** (An awareness of the existence of something)	Knowledge (including knowledge of condition/scientific rationale) Procedural knowledge Knowledge of task environment	Do you know about PrEP?
2. **Skills** (An ability or proficiency acquired through practice)	Skills Skills development Competence Ability Interpersonal skills Practice Skill assessment	Do you know how to prescribe PrEP?
3. **Memory, Attention and Decision Processes** (The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives)	Memory Attention Attention control Decision making Cognitive overload/tiredness	Is prescribing PrEP something you usually do?
4. **Behavioural Regulation** (Anything aimed at managing or changing objectively observed or measured actions)	Self-monitoring Breaking habit Action planning	Do you have systems that you could use for monitoring whether or not you have carried out PrEP services?
5. **Environmental Context and Resources** (Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour)	Environmental stressors Resources/material resources Organisational culture/climate Salient events/critical incidents Interaction between person and environment Barriers and facilitators	To what extent do physical or resource factors facilitate or hinder PrEP service delivery?
	Social pressure	

6. **Social Influences** (Those interpersonal processes that can cause individuals to change their thoughts, feelings or behaviour)	Social norms Group conformity Social comparisons Group norms Social support Power Intergroup conflict Alienation Group identity Modelling	To what extent do social influences facilitate or hinder PrEP service delivery?
7. **Social/Professional Role and Identity** (A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting)	Professional identity Professional role Social identity Identity Professional boundaries Professional confidence Group identity Leadership Organisational commitment	Is prescribing PrEP compatible or in conflict with professional standards/identity?
8. **Beliefs about Capabilities** (Acceptance of the truth, reality, or validity about an ability, talent or facility that a person can put to constructive use)	Self-confidence Perceived competence Self-efficacy Perceived behavioural control Beliefs Self-esteem Empowerment Professional confidence	How difficult or easy is it for you to provide PrEP services?
9. **Optimism** (The confidence that things will happen for the best or that desired goals will be attained)	Optimism Pessimism Unrealistic optimism Identity	How confident are you that the problem of implementing PrEP services will be solved?

10. **Beliefs about Consequences** (Acceptance of the truth, reality or validity about outcomes of a behaviour in a given situation)	Beliefs Outcome expectancies Characteristics of outcome expectancies Anticipated regret Consequents	What do you think will happen if you provide PrEP services?
11. **Intentions** (A conscious decision to perform a behaviour or a resolve to act in a certain way)	Stability of intentions Stages of change model Transtheoretical model and stages of change	Have you made a decision to provide PrEP services?
12. **Goals** (Mental representations of outcomes or end states that an individual wants to achieve)	Goals (distal/proximal) Goal priority Goal/target setting Goals (autonomous/controlled) Action planning Implementation intention	How much do you want to provide PrEP services?
13. **Reinforcement** (Increasing the probability of a response by arranging a dependent relationship or contingency between the response and a given stimulus)	Rewards (proximal/distal, valued/not valued, probable/improbable) Incentives Punishment Consequents Reinforcement Contingencies Sanctions	Are there incentives to provide PrEP services?
14. **Emotion** (A complex reaction pattern, involving experiential, behavioural and physiological elements, by which the individual attempts to deal with a personally significant matter or event)	Fear Anxiety Affect Stress Depression Positive/negative affect Burn-out	Does PrEP service evoke an emotional response to you?

[α]According to the definitions from the American Psychological Association[248]

[β]Questions are revised from Michie et al. (2005 & 2014)[37,235]

Source: Reproduced from Cane et al.[36]

3.3.3 Rationale for using the combined COM-B/TDF model

My definition of needs distinguishes itself from most theories of needs by breaking disciplinary boundaries between implementation science and health psychology. I chose the combined COM-B/TDF model as my core framework based on three justifications. First, this combination has been reported as a reliable and applicable framework in various settings, including systematic reviews, intervention design and project evaluation.[37,249–251] Integration of the TDF and the COM-B has been validated to strengthen the depth and breadth of behavioural analyses.[36] Table 3.2 reveals the linkage between TDF domains and COM-B components.

Second, studies have successfully applied both models to explore health practitioners' prescribing behaviour (e.g., antibiotic prescribing in Australia and the UK).[252,253] Third, both models have been employed to investigate the facilitators/barriers (or enablers/disablers) to *ad-hoc* behaviour.[243] Previous studies also demonstrate the applicability for designing questionnaires and identifying providers' prescribing needs.[254–256] Both validated applications support my definition of service provision needs and study objectives in this thesis.

Furthermore, the integration of COM-B/TDF can compensate intrinsic limitations of the COM-B for measuring needs. One criticism of the COM-B is its oversimplification in needs assessments. For example, in Witzel's study[257(p152)] of the uptake of HIV self-testing among MSM in the UK, he concludes that the COM-B omits the 'normative' and 'comparative' needs in Bradshaw's typology of social needs.[216 (pp72-74)] Witzel's critiques imply different connotations of needs between Bradshaw's typology and the COM-B model. Specifically, Bradshaw aims to describe needs from various angles, while the COM-B maps out essential components that may determine individual behaviour.

The COM-B cannot function in a service or policy vacuum. I argue that Bradshaw's 'normative need' is contained in the selection of the target behaviour to which the COM-B is applied rather than being a subset of the COM-B. Similarly, 'comparative need' is contained in the decision as to what outcomes the COM-B generates (e.g., at the policy level of whether behaviour change occurs).

Another criticism of the COM-B is that it may over-generalise human behaviour. Ogden worries that the top-down approach used by the COM-B and its extensions for designing behavioural interventions might compromise the variability and subjectivity of target populations identified in research.[258] Nevertheless, neither Witzel nor Ogden[257,258] repudiates the applicability of COM-B in needs assessments. I contend that, together with its detailed

and extensive derivative (i.e., the TDF), the COM-B has great potential in assessing physicians' needs for PrEP service provision.

The COM-B/TDF model is consistently adopted throughout my research process. Three COM-B components and 14 TDF domains serve as a theoretical foundation for interview guide development, an analytical framework for both documentary and interview analysis and an evaluative tool for questionnaire development based on my qualitative findings. This consistent theoretical application increases the rigour of my DrPH thesis. Moreover, given most studies employing the COM-B/TDF were from Anglophone countries,[243] the thesis provides me with an opportunity to examine the applicability of this integration for assessing the needs of providers in a non-Anglophone context (i.e., Taiwan). I discuss the feasibility and applicability of the COM-B/TDF in Chapter 8.

Table 3.2 The COM-B/TDF framework applied in the study

Components in the COM-B model		Domains in the TDF
Capability	Physical	Skills (physical)
	Psychological	Skills (cognitive and interpersonal)
		Knowledge
		Memory, attention and decision processes
		Behavioural regulation
Opportunity	Physical	Environmental context and resources
	Social	Social influences
Motivation	Reflective	Social/professional role and identity
		Beliefs about capabilities
		Optimism
		Beliefs about consequences
		Intentions
		Goals
	Automatic	Reinforcement
		Emotion

COM-B: Capability–Opportunity–Motivation–Behaviour; TDF: Theoretical Domains Framework. Source: Reproduced from Cane et al.[36]

Chapter 4 Methodology and Phase One Methods

This chapter presents my two-phase study design for survey development, followed by detailed descriptions of two research activities that I conducted in Phase One. The chapter presents methods for sampling strategies, data collection and data analysis of both document research and in-depth interview. I close the chapter by reflecting on ethical considerations and my positionality in this study.

4.1 Study design

This study applied a multi-method qualitative design.[259] The design was chosen because no single qualitative method alone can measure the context-specific needs of providers, and no relevant quantitative instruments have been developed in Taiwan. By adopting multiple qualitative approaches, I could minimise the limitations of each method and ensure the needs of CSTIPs in the Taiwanese context are presented in the theory-informed questionnaire as a quantitative product.

My study consisted of two sequential phases: a seven-month formative phase (Phase One) and a 12-month survey development phase (Phase Two). All study activities were conducted by me from June 2019 to December 2020. Activities in Phase One were carried out during fieldwork in Taiwan, whereas those in Phase Two were completed through online communications due to the COVID-19 pandemic starting from March 2020. Figure 4.1 presents a procedural diagram of my study design. In Phase One, I collected qualitative data from documents and in-depth interviews on the PrEP provision needs of CSTIPs. Next, I applied the COM-B/TDF model to analyse both sources of qualitative data. At the beginning of Phase Two, I generated survey items using the findings from Phase One while applying the COM-B/TDF framework. I employed this design to improve the cultural appropriateness and methodological rigour of my needs-based questionnaire. Subsequently, I pretested the questionnaire by conducting three rounds of cognitive interviews with CSTIPs. Using the findings from the cognitive interviews and feedback from my survey committee, I iteratively revise the questionnaire before confirming the final version. Due to limited timeframe and scope for the DrPH project, a theory-informed, context-specific and web-based questionnaire is the final product of my thesis. This decision was suggested and approved by my DrPH Review Panel at LSHTM.

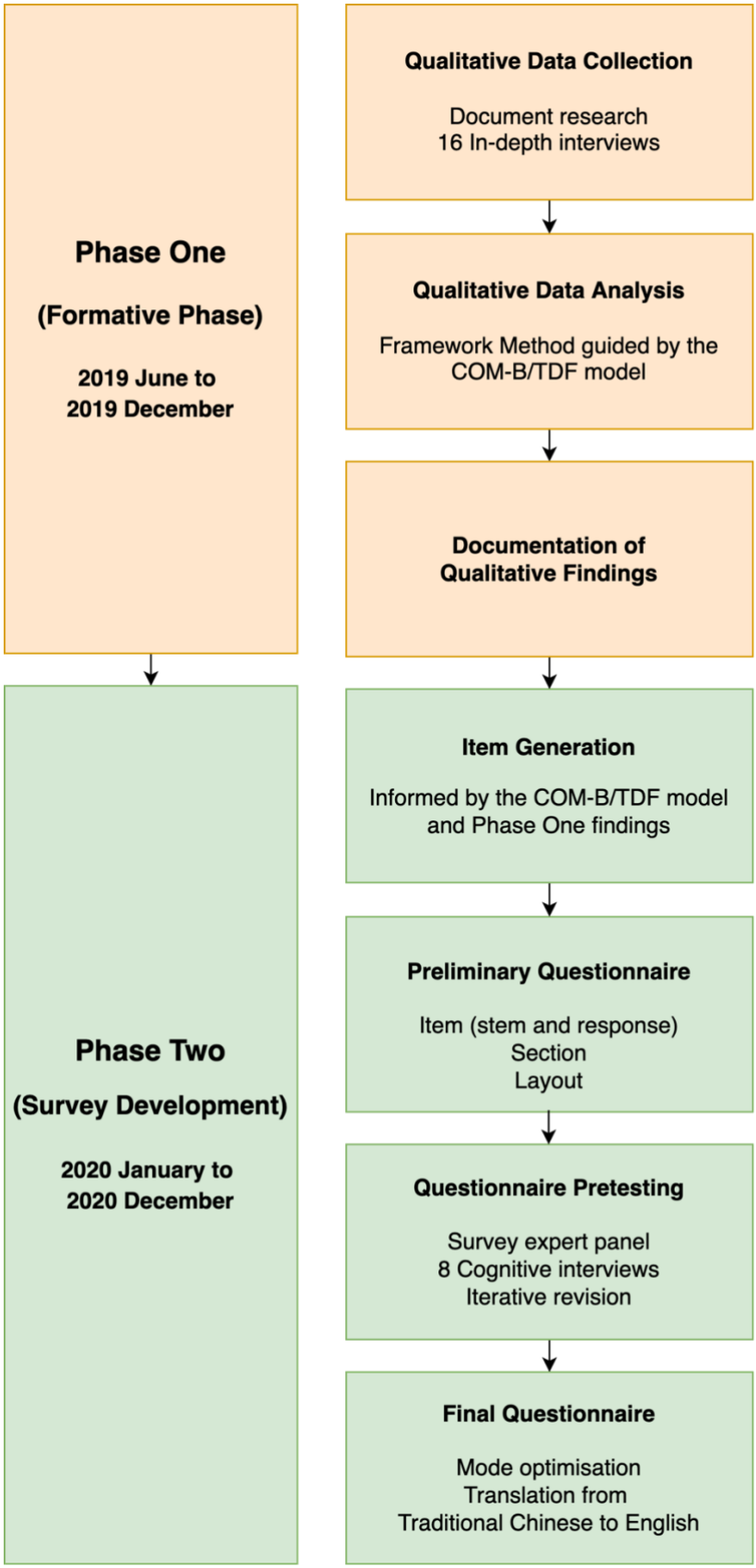


Figure 4.1 A flow chart of the study design

COM-B: Capability–Opportunity–Motivation–Behaviour; TDF: Theoretical Domains Framework.

4.2 Study population

To develop a CSTIP-tailored questionnaire, my study solely focusses on all CSTIPs in Taiwan. The rationale for studying CSTIPs was justified in Chapter 2. My criteria for defining CSTIPs were:

1. 'STI-friendly physicians' certificated by the Taiwan Centers for Disease Control (TCDC) through training held by medical societies by June 2019 (when this study commenced); **and**
2. their names and practice locations listed on the 'STI-friendly clinics' website of the TCDC;[30] **and**
3. physicians who practice in non-hospital settings (i.e., private clinics and public health centres) in Taiwan.

4.3 Phase One methods

4.3.1 Document research

4.3.1.1 Rationale

A documentary approach was employed to contextualise how the TCDC has implemented its national PrEP programme (National Programme) for HIV prevention. Using this method, researchers can acquire knowledge and understanding of the historical process of policymaking in which they have not participated.[260] While scholars question documents as 'transparent representations' for understanding practices and contexts in society,[261(p58)] I argue that this approach could best address Objective 1 because observation methods were not feasible. Specifically, most CSTIPs in Taiwan were not PrEP providers, so their needs were hardly captured through observation in their daily practice. As described in Section 2.3.2, the TCDC has rolled out the National Programme since September 2018. Published documents provided me with an overview of the Programme and helped me understand the political and social contexts of Taiwan's PrEP implementation in a temporal sequence.

4.3.1.2 Document selection criteria

Documents examined in this study were of primary sources, defined as 'standardised artefacts' containing original content without being analysed.[262] Selected documents needed to meet the following five criteria:

1. The title or content includes one of the following terms: 'Pre-exposure prophylaxis (PrEP)', 'Taiwan CDC PrEP programme', 'government-funded PrEP', 'PrEP scale-up', 'PrEP implementation' or 'PrEP programme' **and**
2. written in English or Traditional Chinese (the official language of Taiwan); **and**

3. published or accessible since 2016, the year when Taiwan firstly initiated the government-led PrEP project; **and**
4. produced by institutions involved in PrEP services in Taiwan, including the Ministry of Health Welfare (MOHW), the TCDC, Public Health Bureau (PHB) of local governments, pharmaceutical companies, the Taiwan AIDS Society (TAS) or medical societies certificating CSTIPs (i.e., the Taiwan Association of Family Medicine, the Taiwan Association of Obstetrics and Gynaecology and the Taiwan Urological Association); **and**
5. produced as reports, announcements, minutes, presentation slides or printed matter (e.g., flyer, leaflet and brochure). Documents could be paper- or web-based.

4.3.1.3 Data collection

As per the selection criteria, I collected documents from websites of institutions involved in PrEP services in Taiwan (described above). With verbal permission from event organisers, I also ascertained paper-based documents from three training sessions held by the three medical societies certificating CSTIPs as well as local conferences/symposia related to PrEP implementation. Appendix 1 presents a standardised form to manage and compile collected documents.

Table *4.1* presents the characteristics of all 48 documents included in analysis. Considering originality, 46% (22/48) of the collected files were from the TCDC, followed by 17% (8/48) from TAS and 15% (7/48) from pharmaceutical companies. Announcement/official letter, marketing material and presentation slides were the most common three types of documents. Also, half of the documents (50%, 24/48) were published in 2019, one year after the National Programme commenced.

Table 4.1 Characteristics of the 48 documents included in analysis

Characteristics	Number	Proportion (N=48)
Source		
TCDC	22	46%
Taiwan AIDS Society	8	17%
Pharmaceutical company	7	15%
Medical specialist society	5	10%
MOHW	3	6%
Public Health Bureau	3	6%
Type		
Announcement / Official letter	17	35%
Marketing material (Flyer, leaflet and brochure)	10	22%
Presentation slides	9	19%
Proposal, report and guidance	9	19%
Video	3	6%
Year		
2016	2	4%
2017	2	4%
2018	10	21%
2019	24	50%
2020	10	21%
Format		
Web-based	34	71%
Paper-based	14	29%

TCDC: Taiwan Centers for Disease Control; MOHW: Ministry of Health and Welfare.

4.3.2 In-depth interview

4.3.2.1 Rationale

Semi-structured in-depth interviewing was applied to reach Objective 2 by investigating the perceived needs of CSTIPs for providing PrEP services to MSM. This approach is advantageous to exploring rich and detailed meanings from individual viewpoints on specific topics while covering the domains of the analytical framework.[263,264] Given CSTIPs comprised various specialists working at their sole medical practices without existing inter-speciality platforms, the unit of interview was individual physicians. Compared with focus group discussion,[265] one-to-one interviews can better identify service provision needs at a personal level. This approach was also aligned with the notion of the COM-B/TDF model which focusses on the needs of individuals rather than groups or communities.

4.3.2.2 Sampling

I purposively sampled 16 physicians from all CSTIPs in Taiwan, considering the limited time for the formative phase of this DrPH project. While theorists may question whether the size of 16 participants can achieve the status of 'data saturation',[266,267] a term derived from grounded theory,[268] this is of less concern for my study. For the purpose of my inquiry, the COM-B/TDF model is used as an *a priori* analytical framework that comprehensively maps out the hypothesised service provision needs. In studies using a deductive approach, Saunders et al. affirm that saturation meant 'the extent to which pre-determined codes or themes are adequately represented in the data'.[269(p1898)] Furthermore, with a sampling strategy maximising diversity among participants, I contend that 16 interviews provide me with sufficient scope and produced rich accounts capturing the range of service provision needs.

The tenet of sampling was to ensure the diversity of interviewees based on three characteristics: experience in PrEP prescribing, medical speciality and geography. These variables were chosen on the grounds that they could potentially determine the context of physician's practices. Moreover, sampling schemes based on the three variables were feasible as they were mutually exclusive, well-documented and publicly accessible. Whether delivering PrEP services or not, CSTIPs comprise physicians who work in four geographical regions (i.e., Northern, Central, Southern and Eastern) in Taiwan being certified by three medical specialist societies (Family Medicine, Obstetrics and Gynaecology and Urology). To maximise the diversity of interviewees and their needs, I employed a proportionate stratified sampling by speciality with quotas of geography as well as experience in PrEP delivery.

The sampling framework was designed in three steps. To begin with, I decided on a one-to-one ratio of PrEP prescribers and non-prescribers. An equal quota of both groups offered me an opportunity to compare the perceived needs of PrEP adopters with non-adopters. This meant that 8 out of 15 adopters and 8 out of 683 non-adopters from all 698 CSTIPs were selected in June 2019. Warranting oversampling of PrEP adopters, I justified my sampling strategy with two reasons. First, instead of measuring the extent of needs, in-depth interviewing aimed to explore a diverse range of needs that contributed to survey development. Thus, my non-probability quota sampling would be beneficial for maximising diversity in respondent characteristics. Second, I contended that, compared with non-prescribers, prescribers had satisfied some needs for PrEP service delivery (e.g., knowledge and skills). Therefore, the oversampled prescribers would help me to identify a wider range of needs and feasible strategies for initiating PrEP delivery.

Next, I stratified CTIPS by medical speciality. The sample size in each stratum was proportionate to the number of physicians practising in each speciality. Subsequently, the geography quota was introduced with two different approaches. For PrEP-adopters, I applied a proportional quota based on the number of CSTIPs delivering PrEP in each region. Given no CSTIPs working in Eastern Taiwan delivered PrEP, the proportional quota improved the feasibility of my sampling more than an arbitrary quota. Moreover, as there were 15 PrEP adopters across four regions, this strategy protected the confidentiality of interviewees by preventing all providers in the same region from being sampled. For non-adopters, I employed a fixed-number geography quota (i.e., two interviewees per region) to ensure CSTIPs from every region were included.

Upon confirming the number of sampled participants in each cell of the speciality-geography matrix, I labelled every physician on the TCDC's registrant directory with an identification number using Microsoft Excel. A matrix of speciality by geography was created to record the sampling results. After reconfirming the sample size in each stratum, I generated a random function for sample selection. The process of selection started from the speciality with the fewest number of physicians until the expected number for the speciality were attained with practice locations noted. I then moved to the speciality having the next largest number of CSTIPs and repeated the process. When a specific geography quota was filled, I stopped choosing physicians from that region and focussed on the remaining regions until all expected numbers in each cell of the matrix were reached. If a sampled physician refused to take part in interviews, the above sampling process was rerun until one with the same speciality and region of practice was identified and agreed. The size of sub-groups was retained flexibly as qualitative sampling does not aim to reach statistical representativeness

but to capture diverse needs addressed by interviewees with various demographics. Table 4.2 demonstrates my sampling framework with the actual/estimated number of interviewees by stratification.

Table 4.2 The sampling framework applied in Phase One in-depth interviews

(A) Proportionate stratified sampling by speciality

	Number of non-prescriber			**Number of PrEP prescriber**		
Speciality	**Total**	**Quota**	**Actual interview**	**Total**	**Quota**	**Actual interview**
Urology	41	0.5	1	13	6.9	7
Obstetrics and Gynaecology	81	0.9	3	0	0	0
Family Medicine	486	5.7	4	2	1.1	1
Others	75	0.9	0	0	0	0
Total	**683**	**8**	**8**	**15**	**8**	**8**

(B) Purposive sampling with designated geography quota

	Number of non-prescriber		**Number of PrEP prescriber**	
Geography	**Expected (fixed quota)**	**Actual interview**	**Expected (Proportional quota)**	**Actual interview**
Northern	2	2	1.6	2
Central	2	2	1.6	1
Southern	2	2	4.8	5
Eastern	2	2	0	0
Total	**8**	**8**	**8**	**8**

4.3.2.3 Recruitment

I requested support from medical societies to recruit study participants. This strategy was adopted to increase the willingness of physicians to participate in interviews. After establishing the sampling framework, I contacted the three medical societies certifying CSTIPs (described above), with none of which I was personally affiliated. I debriefed the aim, objectives and ethical obligations of my study to the societies before requesting their assistance in inviting sampled CSTIPs to interviews. All three societies agreed to support the recruitment process.

A customised e-mail invitation, a standardised participant information sheet with a consent form (Appendix 2) and a name list of sampled specialists were provided to a staff member responsible for CSTIP certification at each medical association. The staff member then contacted sampled physicians via e-mails or phone calls, followed up physicians' replies and informed me about name of CSTIPs agreeing to be interviewed. Next, I contacted potential participants using the phone number of their practices in the public domain. I debriefed each physician on the purpose of my study, their rights as participants and the confidentiality of their responses before answering their questions about the study. Once obtaining verbal agreement, I confirmed with each participant the preferred time and place for face-to-face interview. An interview guide was sent to interviewees in advance upon request.

4.3.2.4 Development of interview topic guide

An interview guide (Appendix 3) was developed through the following steps. To begin with, I collected examples of interview questions from Michie et al.[37,235] and a TDF-informed question list from Rubin et al.[270] The former was selected as the origin of applying the COM-B/TDF model to qualitative interviews, whereas the study population of the latter was similar to CSTIPs. The first draft of my topic guide consisted of 24 questions in English. I then discussed this draft with my supervisor and members of my advisory committee to ensure questions were non-ambiguous, non-leading and open-ended. After iterative revision, I translated the topic guide into Traditional Chinese and informally tested the topic guide with two Taiwanese medical workers who were not CSTIPs. Reflecting on their feedback, I removed clinical case questions because explaining clinical scenarios would increase interviewees' cognitive burden and lead the conversations towards a focus on patients rather than physicians themselves. Such questions could also compromise opportunities for exploring other needs outside knowledge and skills of PrEP prescribing. In addition, needs of PrEP adopters and non-adopters could be different based on their experiences in service delivery. Therefore, the final interview guide was revised as 21 questions, two of which were

adjusted to interviewees' experience. No further changes to the topic guide were made throughout interviews.

4.3.2.5 Interview process

Of all 33 CSTIPs contacted, 17 declined and 16 CSTIPs agreed to be interviewed. All 16 interviews were conducted face-to-face by me in Traditional Chinese, the official language of Taiwan. Before starting each interview, I introduced myself, my academic affiliation and my identity as a junior physician trained in Taiwan to build rapport with participants. Next, I explained the purpose of this study, ensured confidentiality and the rights of interviewees as written in the consent form (Appendix 2), and answered any questions. Upon agreement, two copies of informed consents were co-signed, one kept by the interviewee and one by me. Of 16 completed interviews, 15 were audio-recorded by an encrypted electronic recorder with additional hand-written notes; one interviewee refused to be audio-recorded and only agreed to notetaking by hand. Each participant was interviewed only once at this phase, and the length of interviews lasted from 45 to 75 minutes. At the end of the interview, I gave a gift voucher valued at 300 TWD (equivalent to £7.5) to interviewees to appreciate their participation in the study.

Table 4.3 reveals the characteristics of the 16 participants in Phase One. Half of the interviewees were urologists, followed by four family physicians and three gynaecologists. Almost half of (7/16) participants were practising in Southern Taiwan. Of all interviewed PrEP providers, the majority were urologists and practised in Southern Taiwan.

Table 4.3 Characteristics of 16 participants in Phase One in-depth interviews

Identification Number	Date of the interview	Type of PrEP service	Jurisdiction	Speciality
I-01	17/06/2019	S	Northern	Family Medicine
I-02	24/06/2019	S	Southern	Urology
I-03	22/08/2019	S & T	Southern	Urology
I-04	02/09/2019	S	Southern	Urology
I-05	11/09/2019	Nil	Southern	Gynaecology
I-06	12/09/2019	S	Central	Urology
I-07	13/09/2019	S	Southern	Urology
I-08	25/09/2019	S	Northern	Urology
I-09	26/09/2019	Nil	Central	Family Medicine
I-10	27/09/2019	Nil	Central	Urology
I-11	27/09/2019	Nil	Southern	Family Medicine
I-12	28/09/2019	Nil	Eastern	Family Medicine
I-13	14/10/2019	Nil	Eastern	Gynaecology
I-14	15/10/2019	Nil	Northern	Gynaecology
I-15	16/10/2019	Nil	Northern	Family Medicine
I-16	24/10/2019	S & T	Southern	Urology

PrEP: Pre-exposure prophylaxis; S: Self-paid PrEP; T: Taiwan CDC National PrEP programme. Note: Identification number was assigned to maintain confidentiality. The sex/gender of interviewees is not presented to maintain confidentiality.

Experience and current practice for sexual health services

At the beginning of the interview, physicians were asked about their specialities and how many years they had been certificated as 'STI-friendly physicians' in Taiwan. The two questions helped me to consolidate rapport with interviewees by showing interest in their training background while reconfirming their eligibility as being CSTIPs. Next, physicians were asked about the typical number of patients with STIs per week they saw in the last six months and what types of sexual health services they were delivering in daily practices. Given physicians could provide non-sexual-health services to patients (e.g., general health check-up by family medicine doctors or urodynamic testing by urologists), they were asked about the centrality of sexual health services in their clinic. Lastly, a question on HIV preventative measures in Taiwan was introduced to bridge the interview into PrEP-related questions in next sections.

Capability of PrEP service delivery

To identify needs related to capability, I asked physicians whether they have heard of PrEP and sources of their information. Those who heard of PrEP were asked about client eligibility for PrEP, side effects of PrEP and modality of PrEP use. If physicians had never heard of PrEP, I debriefed them about the regimen, eligibility, contraindications and recommended modalities of PrEP per the Taiwan national PrEP guideline.[12]

Opportunity and motivation for PrEP service delivery

As motivation and opportunity involved various kinds of needs and may be interconnected, a list of probes was used followed by physicians' answers. Physicians were first asked whether they would recommend PrEP to heterosexual users with justifications. This was further prompted by asking what if this user was their close relative/friend with more probes related to domains like social influence and their social/professional roles. Moving to their needs for PrEP service delivery, I adjusted questions based on interviewees' experience in PrEP prescribing. PrEP adopters were asked why they commenced service delivery and the factors driving it, followed by reflections on their experience in delivery and requirements for service continuation. Non-adopters were asked whether they would be willing to deliver PrEP services at their clinics with justifications, followed by why they had not yet provided PrEP services.

Considering the existing context of the National Programme, all interviewees were asked whether they had considered joining the programme and why (not). Subsequently, they were asked what kind of factors would increase their willingness to deliver PrEP services. Two follow-up questions probed factors reducing their willingness to deliver PrEP.

Recommendations on PrEP services in the future

To generate evidence-based and context-specific recommendations on Taiwan's PrEP implementation, I asked physicians about suggestions on various aspects of PrEP service delivery. They were queried on which medical practices would make appropriate PrEP sites and their thoughts if Taiwan's government would request all CSTIPs to deliver PrEP services. Lastly, physicians were asked in what ways Taiwan's government could meet the needs of CSTIPs for PrEP service provision. Under ethical considerations, before ending the interview, I provided participants with key information on PrEP service delivery in Taiwan, such as the latest version of Taiwan national PrEP guideline,[12] audio/visual learning material produced by Taiwan CDC and information on how to become a PrEP provider in the National Programme.

4.3.3 Qualitative data analysis

The objective of analysing both documents and in-depth interviews was to identify key themes for questionnaire development. I applied the Framework Method[271] which analyses qualitative data in a systematic matrix-based fashion with flexibility in inductive interpretation.[272] This approach was adopted because the COM-B/TDF model is deemed a comprehensive framework to identify the needs of CSITPs. Moreover, the framework approach has been widely used to generate recommendations for public health interventions,[273] which matches with the purpose of this study.

4.3.3.1 Preparation prior to data analysis

Collected documents were reviewed and annotated using the following categories adapted from Gorsky's guidance on documentary analysis: authenticity, purpose, style and producer of documents.[260(p157)] Also, contents related to PrEP services delivery (e.g., type of PrEP programme, process of service provision, eligibility of providers/users, costs and timeline of programme) were recorded.

Interview recordings were verbatim transcribed in Traditional Chinese. I took two approaches to increase the accuracy and efficiency of interview transcripts within a limited budget. Of all 16 interviews, eight were transcribed using Yating Transcriber,[274] a Taiwan-based application producing free real-time transcriptions of Traditional Chinese by artificial intelligence technologies. This application is manufactured by a research organisation called Taiwan AI Labs with qualified data protection.[275] According to the company's privacy policy, uploaded files will be neither used without users' permissions nor kept in any database upon deletion of data. The rest of the interview recordings were transcribed through a professional transcription service in Taiwan with no conflicts of interest. I then proofread and copyedited scripts by revisiting all audio-recording files twice so that all verbatim transcripts were accurate, unambiguous and unabridged. Regarding translation issues, given translation may distort the original meaning of transcribed texts, I analysed all data in Traditional Chinese without further translation into English.

4.3.3.2 Process of analysis

My analysis follows Ritchie and Spencer's five-step approach to the Framework Method: familiarization, framework identification, indexing, charting and mapping with interpretations.[271] To begin with, I got acquainted with the data by reading all interview transcripts, annotated documents and corresponding field notes three times. Next, I applied the COM-B/TDF model as a deductive framework to identify themes related to CSTIP's

PrEP prescribing needs. Specifically, I considered all constructs in each TDF domain (Table 3.1) as potential codes *a priori*, so all 14 TDF domains functioned as designated themes/categories. To retain flexibility and avoid 'over-fitting' data into the framework, I allowed new codes to emerge from the data. Emerging codes were further examined and integrated using the operational definitions of the TDF domains (Table 3.1) through iterative discussion with my supervisor and advisors. Subsequently, I indexed specific interview scripts by labelling them with one or more codes. To improve the accuracy and quality of indexing, I performed an audit approach by translating three interview transcripts word-by-word into English and comparing the results of indexing between my supervisor and me. All discrepancies in indexing were reviewed and resolved. After the cross-checking process, I continued indexing the remaining 13 transcripts. I then tabulated all indexed quotes against the categories (informed by 14 TDF domains) in ascending order of interviewees' assigned identification number. Lastly, I re-read all categories and quotes in the chart and interpreted the results using a 'describe, compare and relate' strategy proposed by Bazeley for qualitative analysis.[276(p16)] Identified categories (domains), sub-categories (constructs) and relevant quotes were taken as being the needs of CSTIPs for PrEP service delivery. All data were coded, grouped, tabulated and interpreted using a computer-assisted software Quirkos (version 2.4.2).[277]

4.3.4 Data quality

Departing from the focus of validity and reliability for quality judgement, I used various strategies to ensure that my qualitative analyses were credible, trustworthy and transferrable.[278] To increase the credibility of my qualitative findings, firstly, I applied Denzin's 'between-method triangulation'[279(p302)] which utilised data collected from two methods (i.e., primary documents and in-depth interviews). This strategy is recommended by Denzin and other scholars from various disciplines to deepen the breadth and width of qualitative investigations.[280–282] This approach also helped me generate rich contextual descriptions of the National Programme (Objective 1). Secondly, for needs identification (Objective 2), I applied a 'peer debriefing'[283(p275)] approach by requesting Taiwanese advisors familiar with the clinical context of CSTIPs to feedback on whether identified themes, explanations and quotes were relevant and sensical. Thirdly, I underpinned the limitations of both methods to improve the transparency of my analytic steps and findings in Chapter 8. To ensure the accuracy of my framework analyses, I examined all the document annotations, interview transcripts and audio-recordings twice. Typing errors and ambiguity in the data (e.g., the meaning of pronouns) were thus minimised. Also, I consistently applied the definitions of TDF domains throughout the framework approach for increasing transferability. I achieved so by creating a qualitative codebook together with analytic memos documenting

each decision made for code assignments. Lastly, the cross-checking exercise during indexing consolidated my coherent and comprehensive use of the COM-B/TDF model, which made the findings in Phase One more theory-informed and compatible with the questionnaire development in Phase Two.

4.3.5 Data reporting

To fully present the diversity of needs in my thesis, I decided to additionally include relevant transcripts of cognitive interviews in Phase Two (fully described in Section 6.3.5). To avoid repetition and minimise potential biases, I only included transcripts from four participants who did not take part in Phase One (i.e., S-05, S-06, S-07 and S-08). The linkage between participants in Phase One and Phase Two is shown in Table 4.4. Audio-recording files of the four interviews were firstly transcribed by Yating Transcriber, followed by the process explained in Section 4.3.3.2. As a result, a total of 20 interviews (16 from Phase One and four from Phase Two) were analysed and reported altogether to identify the unmet needs of CSTIPs.

Table 4.4 Comparison of participants in Phase One and Phase Two

Phase	**Research activity**	**Number of participants**	**Identification**	**Period of data collection**
One	In-depth interview	16	I-01 – I-16	2019 June to 2019 October
Two	Cognitive interview for questionnaire pretesting	8 (Including four physicians recruited in Phase One)	S-01 (I-03) S-02 (I-04) S-03 (I-09) S-04 (I-14) S-05 S-06 S-07 S-08	2020 June to 2020 August

4.4 Ethical considerations

Prior to commencing research activities, ethical approval had been obtained from the LSHTM Research Ethics Committee (reference number: 17128/RR/13952, Appendix 4) as well as the Institutional Review Board from National Cheng Kung University in Taiwan (reference number: A-ER-108-103, Appendix 5). All changes in research activities were approved by both bodies in the form of amendments. Both the access to and use of private documents were verbally approved by corresponding owners.

Given the project aimed to understand physician's needs for delivering PrEP services, no significant ethical concerns were expected in the research process. To protect the confidentiality of all interviewees, I did not present identifiable information in this thesis. I assigned each interviewee with a unique identification number based on the date of interview. Also, the sex/gender of interviewee was not reported to maintain confidentiality. Since there was only one female CSTIP prescribing PrEP in 2019, reporting interviewees' sex/gender would make them identifiable and thus break confidentiality promised in informed consents. Also, in-depth interviewing in the formative phase did not aim to measure the effect of sex/gender on respondents' prescribing needs. Regarding data security, I double-checked that the transcription application Yating Transcriber did neither use transcriptions for any other purpose nor keep any data after I deleted files processed by the application.

Based on my medical training and previous experience in publishing Taiwan' national PrEP guidelines,[12] I was equipped to provide correct and updated PrEP knowledge to CSTIPs. To ensure that physicians interviewed have a correct understanding of PrEP for HIV prevention, at the end of each interview, I debriefed interviewees about the effectiveness, indications, contraindications, modality of PrEP and answered their inquiries. I also signposted interviewees to other available resources (e.g., the website of the TCDC and the Taiwan AIDS Society) for more information on both PrEP and the National Programme.

4.5 Positionality with the thesis

Throughout the research process, I have been aware of how my multiple identities and roles have situated the thesis from research question, study design, data collection to analysis. Specifically, my identities comprise a UK researcher in public health, a Taiwanese medical doctor and a PrEP user. As a Taiwanese medical doctor dedicated to ending the AIDS epidemic in Taiwan, I believe that increasing PrEP access is the key to achieving this goal. Witnessing a limited number of PrEP delivery sites and being aware of CSTIPs in Taiwan's healthcare system, I decided to advocate decentralising PrEP service delivery (i.e., shifting

from medical centres to community-based clinics) for scaling up PrEP implementation in Taiwan. Such propositions also reflect my personal experience as a PrEP user who had suffered low accessibility of PrEP before commencing this project.
My trio identity has brought both advantages and disadvantages into data collection. Although I do not belong to and had no affiliations with CSTIPs, being a Taiwanese medical doctor helped me to quickly build rapport with interviewees because they considered me as a junior fellow in training. Also, as an unspecialised physician, I could access various specialists and medical societies without worrying about perceived professional territories, which is not uncommon in health professionals and institutions. My previous participation in the writing group for the Taiwan national PrEP guideline and acquaintance with key informants in the Taiwan AIDS society have earned me opportunities to contact government officials and access relevant documents without obstacles.

Regarding disadvantages, my strong belief in decentralising PrEP may make participants express satisfying or PrEP-friendly accounts in interviews, which may introduce acquiescence biases to my findings. Also, my presence as a male researcher may direct the conversation of interviews by focussing on PrEP service delivery to male users, which oversimplified clinical scenarios and the various needs perceived by CSTIPs. In terms of theoretical openness, the choice of the UK-invented COM-B/TDF model arose from my experience during my master's programme at LSHTM. Terms used in the model could affect my interpretations of Taiwanese physicians' needs. Lastly, participant recruitment heavily relied on the three medical societies (described in Section 2.2.6) with which I had no affiliation. The extra efforts in communication made me cognisant of the power dynamics among me, CSTIPs and their affiliated institutions.

4.6 Chapter summary

This study aimed to understand why few CSTIPs delivered PrEP services in Taiwan. With a pragmatic worldview, I applied a two-phased qualitative research design: a formative phase (Phase One) using documentary analysis and 16 in-depth interviews followed by a survey development phase (Phase Two, which I fully describe in Chapter 6 and Chapter 7). Physicians were purposively sampled and recruited using data in the public domain. All data collection and analyses were informed by the COM-B/TDF model to establish theoretical rigour in needs assessment. The methodology met the aim and objectives of this study as it allowed description of the National Programme, identification of what physicians required to deliver PrEP and development of a needs-based questionnaire survey for measuring CSTIPs' needs.

Chapter 5 Phase One Results: Needs of CSTIPs for Delivering PrEP Services in the National Programme

This first results chapter describes the contextual factors surrounding the Taiwan CDC National PrEP Programme (National Programme) and identifies what CSTIPs require to deliver PrEP services to MSM within that programme. The results draw on both document analyses and my interviews with the sampled CSTIPs. In this chapter, I use '(non-)adopters' and '(non-)prescribers' interchangeably to refer to interviewees who had (not) prescribed PrEP.

Unmet PrEP prescribing needs of CSTIPs are identified in all three COM-B components and 14 TDF domains. Findings are presented in order of opportunity, capability and motivation, each of which comprises several corresponding TDF domains. Specifically, the chapter starts by describing how CSTIPs had insufficient opportunities within Taiwan's political and social environment, then identifies gaps in capabilities and ends by revealing a marked lack of motivation for PrEP provision under the National Programme.

5.1 Missed opportunities

5.1.1 Physical opportunity: Environmental context and resources

Physical opportunity refers to opportunities (e.g., time, space and resources) granted by the environment where physicians practise. CSTIPs lacked physical opportunities for becoming registered providers in the National Programme due to historical, programmatic, operational and clinical challenges. While two CSTIPs in the National Programme reflected on how their needs were met by their resources, the rest of the interviewees expressed their unmet needs through these four aspects.

5.1.1.1 Historical: CSTIPs were not incorporated in Taiwan's centralised HIV care system

As PrEP uses antiretroviral medication for HIV prevention, documents showed that the TCDC utilised the HIV care system (described in Section 2.2.2) to run the National Programme.[29,31,108,284] Using the centralised and government-funded HIV care system led to two characteristic features of the National Programme: most PrEP services were hospital-based, and the majority of PrEP prescribers were infectious disease (ID) specialists treating HIV patients. The TCDC's policy documents showed that all 36 hospitals in the Programme were from the designated institutions in Taiwan's HIV care system.[31,108] Given that both PrEP services and HIV care require management for drug adherence and clinical visits, hospitals could apply the same case management system for HIV patients to PrEP users,

which therefore reduced resources in need for PrEP service provision. This reflected a small increase in the number of hospitals in the National Programme from 36 in 2019 to 40 in 2020.[285,286]

In contrast, CSTIPs were not considered by the TCDC as the default providers in either the HIV care system or the National Programme. Historically, the role of CSTIPs in HIV care was limited to HIV testing, and their participation in public health projects was voluntary. For example, CSTIPs did not join in HIV-related public health programmes until the TCDC announced a project called 'universal HIV screening in patients with STIs and drug addicts' in 2008.[287] Commissioned CSTIPs received reimbursement from the TCDC on a fee-for-service basis, which depended on the number of patients with STIs they tested for HIV. Upon diagnosing HIV infection, CSTIPs notified the corresponding Public Health Bureau (PHB) and referred the newly diagnosed patient to designated hospitals for HIV care.

5.1.1.2 Programmatic: CSTIPs were not prioritised for PrEP provider recruitment

The TCDC intended to scale up the National Programme by recruiting more physicians, but its resource allocation implicitly prioritised physicians practising at hospitals. In 2017, the TCDC issued 'regulations on executing HIV pre-exposure prophylaxis for medical institutions'[288] to provide physicians outside the HIV care system with opportunities for delivering PrEP services. Nevertheless, CSTIPs interested in providing government-funded PrEP had limited chances to obtain quotas directly from the TCDC. The Programme's protocol showed that the TCDC adopted a top-down approach to assigning the 2000 slots to 38 contracted medical institutions.[29] The medication for 1000 young people for one year (i.e., 360,000 pills)[289] was a voluntary donation by Gilead for the purpose of 'public welfare.'[29(p27)] The medication for 1000 HIV-negative adults in serodiscordant relationships was procured by the TCDC, in which individuals must be referred by PHBs. In practice, the TCDC preassigned quotas in the National Programme to PHBs at 18 counties/cities. PHBs were responsible for coordinating the assignment of PrEP to providers practising in their jurisdictions and requesting additional quotas from the TCDC. Drawing on documents and interviews,[29,288–290] Figure 5.1 illustrates the dynamics among the TCDC, PHBs, PrEP providers (including hospital-based physicians and CSTIPs) and other key stakeholders within the National Programme from 2018 to 2020.

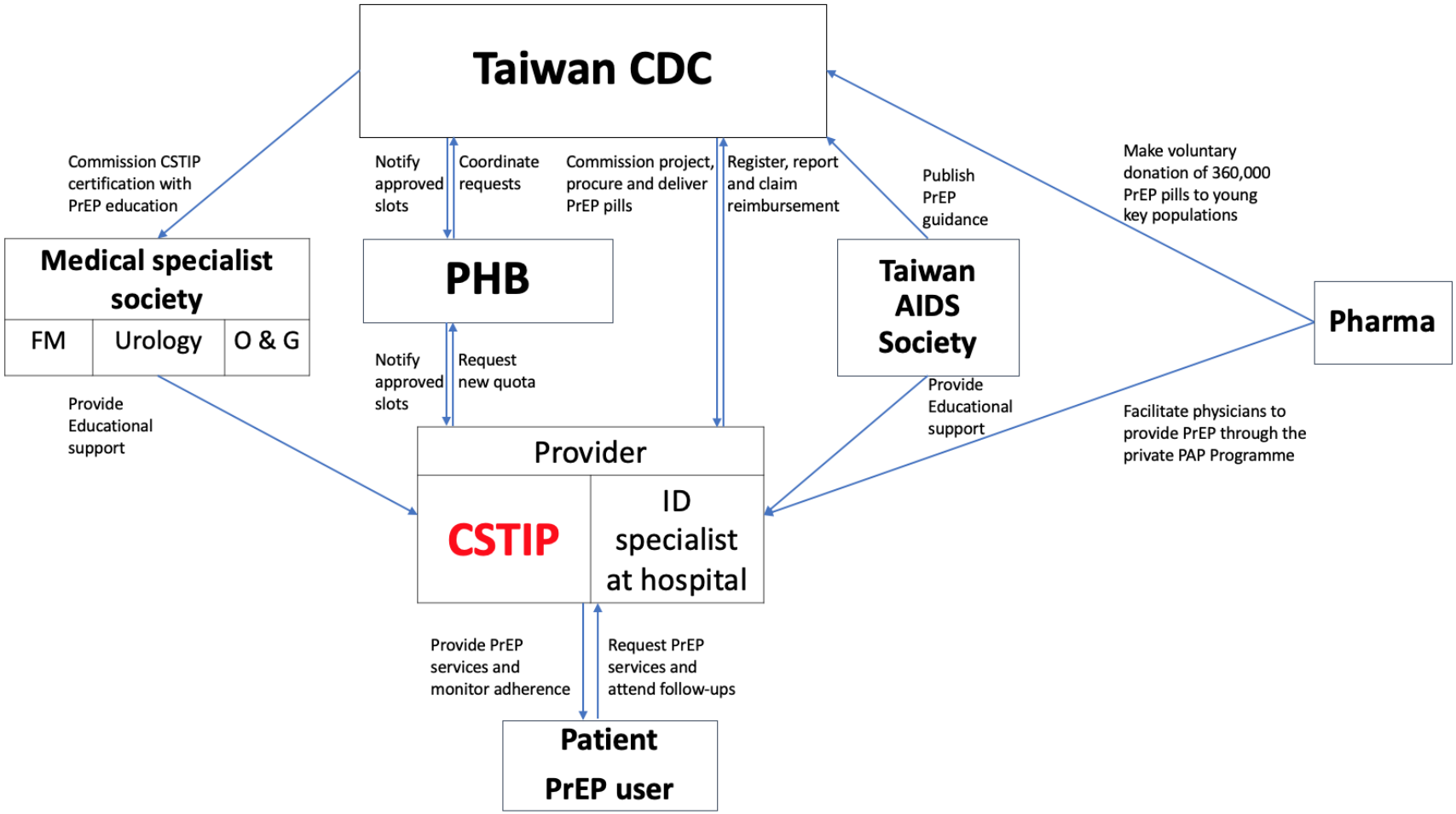


Figure 5.1 Key stakeholders in the Taiwan CDC National PrEP Programme, 2018-2020

Taiwan CDC: Taiwan Centers for Disease Control; PHB: Public health bureau; CSTIPs: Community-based sexually-transmitted-infection-friendly physician; FM: Family medicine; O&G: Obstetrics and gynaecology. PAP: Patient Assistance PrEP programme. Source: the author.

Playing pivotal roles in the roll-out of the National Programme, PHBs were not obligated to recruit CSTIPs for PrEP delivery. According to the protocol, each PHB should recruit one to three medical institutions into the Programme by seeking 'hospitals designated for HIV or hospitals not designated for HIV' in their jurisdictions.[29(p10)] In the protocol, clinics were not mentioned in the paragraphs of PrEP provider recruitment. Thus, PHBs could meet the TCDC's requirement by recruiting physicians at hospitals rather than CSTIPs at private clinics.

Moreover, PHBs did not prioritise PrEP provider recruitment over other public health programmes. In 2018, PrEP was first mentioned in PHB's manuals for performance audit, a critical event determining the annual budget of PHBs from the MOHW using weighted scoring. From 2018 to 2020, PHBs' performance on PrEP was not an independent indicator but a sub-unit of an indicator called 'effectiveness of HIV testing in susceptible populations'. Although the weighting of PrEP provision had increased by three folds (from five points per case in 2018 to 15 points in both 2019 and 2020),[290,291] PrEP was an elective item in the evaluation of PHBs' HIV testing performance. Also, the manuals did not mention the number of PrEP services, which suggested little motivation in PHBs to recruit new PrEP providers. This view was echoed by the accounts from interviewees. When asked about opportunities for PrEP service delivery, a gynaecologist (I-13) claimed that government-led public health programmes did not prioritise private clinics: 'This [PrEP] is equivalent to public health, a type of prevention. Most [public health programmes] are not given to primary care clinics, and many programmes are controlled by public health bureaus.' This remark highlighted that CSTIPs perceived lack of opportunities for delivering PrEP, given that government-led public health programmes may not prioritise CSTIPs as service providers.

The TCDC's policy documents also showed that physicians interested in the National Programme needed to complete a five-step registration process.[29,288] This multi-step application for becoming an authorised PrEP provider precluded CSTIPs' opportunity to deliver PrEP services. To begin with, physicians obtained an educational certificate by completing two-hour PrEP training through face-to-face lectures or online self-learning courses provided by the TCDC. Next, they prepared an official proposal outlining plans for PrEP service provision, including consultation, HIV testing, case management, human resources allocation (e.g., nurses and pharmacists at their premises), budget and an expected number of clients. Subsequently, physicians submitted both the proposal and the educational certificate to the TCDC for further assessment. Assessed by the TCDC's expert panel, approved providers were those who scored at least 75 out of 100 points. Next, as the

representative of their clinics, physicians signed a commissioning contract with the TCDC, agreeing to terms of PrEP procurement, storage, service management, reporting and financial reimbursement. The TCDC then informed the corresponding PHB and medical society that the commissioned CSTIPs were officially registered as government-funded PrEP providers. Finally, names of the new prescribers were added to a PrEP provider list and posted on the TCDC's website for public dissemination.

As most CSTIPs worked in solo practices,[99] many non-adopters noted their limited administrative resources to tackle the multi-step process for registration. A family physician argued that:

> I think that too much paperwork for doing this [PrEP service] is an impediment for many physicians […]. If you want us [physicians] to join [the National PrEP Programme], of course, it's fine, but we hope that the paperwork is not too much. (I-15, non-prescriber)

Although the interviewee seemed to address the needs of other CSTIPs, the remarks implied the perceived need for extra resources for PrEP service preparation due to governmental regulations. In summary, some non-prescribers could not seize the opportunity to become PrEP providers because additional resources for tackling the application process were unavailable.

5.1.1.3 Operational: Lack of HIV testing and perceived financial impacts of PrEP procurement

Most non-adopters stressed that the resources required for operating PrEP services were not available at their clinic. Regarding all activities involved in PrEP service delivery (e.g., consultations and risk assessment, HIV testing, PrEP dispensing and clinical follow-ups), two challenges in resource management were repeatedly mentioned by interviewees: a lack of HIV testing toolkits, and perceived financial constraints for PrEP procurement and stocking.

Surprisingly, although CSTIPs were regarded by the TCDC as sexual health providers at community levels, some did not provide their patients with STI testing services, including HIV testing. A few physicians explained that no HIV/STI testing services were available at their clinics due to few patients with STIs. A gynaecologist (I-14) admitted that: 'No such thing as [STI] screening. Because there are few patients [with STI], you don't have the material [for diagnosis and treatment]; screening is of no use.' As their premises did not allocate for HIV and STI testing, physicians had no opportunities to initiate PrEP services.

As expected, the high cost of stocking PrEP pills was suggested as a crucial unmet need for CSTIPs. Non-adopters argued that the expense of PrEP procurement could impact the financial flexibility of their clinic, given PrEP was strikingly expensive compared with other common prescriptions. According to Taiwan's national drug tariff,[292] the pricing of PrEP was 1380 times higher than paracetamol (345 TWD versus 0.25 TWD), a common prescription by clinicians to relieve cold symptoms. Other interviewees insisted that their collaborative pharmacies would not procure PrEP at such high costs, which deterred them from PrEP prescribing. This view was echoed by a dermatologist who pointed out the costs of PrEP procurement could affect the financial management of the premise:

> The drug procurement [cost] is very real. Because, after all, we are not like [charitable] foundations, we cannot do charity […]. [I] must take this [procurement cost] into consideration, [I] absolutely cannot, or at least, not to lose money. (S-07, non-prescriber)

When I informed interviewees that all PrEP pills in the National Programme were procured and distributed by the TCDC, some physicians agreed that joining the Programme became more feasible. Nevertheless, other interviewees raised another concern about drug stock management and drug expiry. Regarding operational challenges to joining the National Programme, a family physician commented:

> Drug costs and drug stock management can increase [my] workload. Then sometimes medicine may have expired, so [I] need to check […]. You say that government-funded medicine will be delivered to me, but I still need to take care of it [government-funded PrEP]. (I-09, non-prescriber)

This excerpt illustrated the challenges for CSTIPs to manage PrEP stocking. It demonstrated that CSTIPs needed extra physical space and workforce to manage operational challenges in running government-funded PrEP services. Also, perceived lack of opportunities may be reinforced by physicians' knowledge about PrEP, which I described later in Section 5.2.1.

5.1.1.4 Clinical: Time constraints and expected low demand

Opinions differed as to whether time allocation was a barrier to PrEP service delivery. Prescribers reported little difficulty arranging PrEP appointments as they were familiar with the service process. Concern about time availability was more widespread among non-prescribers. One reported issue was that existing medical services occupied physicians' time. Adding PrEP service into clinical schedules could challenge the quality of care and reduce the time allocated for each patient. Two respondents (I-05 and S-05) mentioned that

PrEP consultations and corresponding paperwork could compromise their time with patients, which may negatively impact their patient-physician relationships.

Another reported problem was little return on time spent on PrEP. One physician (I-13) expressed 'time is money,' while others pointed out that the notion of satisfying more patients with less time was pervasive among physicians in general. The notion was derived from the fee-for-service payment system of Taiwan's National Health Insurance. Hence, physicians' needs for PrEP delivery were unmet because their time spent on PrEP-related activities (i.e., health education, risk assessment for HIV and clinical follow-up) could result in negligible financial return. A urologist participating in cognitive interviews argued that the time allocated to PrEP services could be worthless:

> A very pragmatic consideration for clinics in Taiwan is that we are running by numbers; we are boosting patient numbers to run this [clinic] […]. We cannot see very few patients and spend lots of time in educating each patient. Of course, health education in Taiwan is worthless. The PrEP you talked about is relevant to health education in many aspects […]. It [health education] takes time, but there are no corresponding [financial] benefits by taking such time. This is a very real problem. (S-08, non-prescriber)

The characteristics of clinic patients seemed to determine physicians' opportunities for PrEP prescribing. In Taiwan, urologists were generally considered specialists treating male patients with STIs, whereas gynaecologists presumably served female patients and family physicians treated individuals with chronic conditions. Supporting this stereotyped typology, some gynaecologists and family physicians interviewed argued that they had few chances to see male patients at their premises, with even fewer identifying themselves as MSM.

Physicians' opportunities may also depend on users' health-seeking behaviour. For increasing the level of PrEP prescribing, either more patients needed to demand PrEP or more physicians needed to offer it. Although CSTIPs could have identified patients potentially eligible for PrEP, perceived opportunities were few as some interviewees saw only one or two patients with STIs over several months. Some non-adopters stressed that they had never been asked about PrEP in their consultations. Others claimed that patients wanting PrEP would only visit authorised PrEP providers rather than CSTIPs, given the list of PrEP providers was publicly accessible online.

As a result, such disparity in the number of potential users between non-adopters and adopters heightened the unmet needs of non-adopters for gaining opportunities. A gynaecologist attributed their lack of opportunity in prescribing PrEP to the clustering of users' health-seeking behaviour:

> This thing [PrEP] is very clustered. Being clustered means, for example, I [PrEP user] will only come to you [physicians] if I know you can prescribe [PrEP] medication. Otherwise, I [PrEP user] will not come. (I-05, non-prescriber)

This showed a cause-and-effect dilemma where providers' lack of service opportunity and no requests from patients were mutually reinforced. Specifically, the dilemma was that patients did not ask for unavailable PrEP services, whereas practitioners did not explore patients' needs of PrEP. Such dilemmas hindered CSTIPs from satisfying their needs for PrEP delivery.

While non-adopters believed that existing adopters could gain more opportunities in delivering PrEP, physicians doing self-paid PrEP services argued that being approved providers did not guarantee enough PrEP users. The unmet needs of these prescribers could be attributed to two issues. For one, legal considerations of advertising self-paid PrEP could hinder providers from recruiting more potential PrEP users. A few prescribers were unsure whether promoting PrEP at their clinics would violate regulations on medicament advertisement in Taiwan's Pharmaceutical Affairs Act.[293] For another, the visibility of authorised PrEP providers appeared to be limited. Document analyses revealed that the TCDC announced the list of providers at the beginning of the national programme in September 2018.[285] Since then, the TCDC had silently updated names of new providers online without further announcement. One prescriber argued that it was difficult for users to look for the PrEP provider list on the TCDC's website. As a result, both issues may make physicians more likely to rely on patients' requests for PrEP.

Considering patients' demands as opportunities, the two CSTIPs in the National Programme addressed that support from their PHBs was key to their service delivery. One provider described how the needs were satisfied by PrEP user referral from PHBs:

> They [staff in Public Health Bureaus] referred [PrEP users to me] […]. Public Health Bureau helped me to strive for more [PrEP] quotas for young populations. This is very important [to my service]. (I-03, prescriber)

This may partially explain why both CSTIPs would join the National Programme despite their absence in the HIV care system.

5.1.2 Social opportunity: Social influences

Social opportunity for PrEP prescribing refers to opportunities arising from interpersonal communications and cultural norms. After analysing documents and interviews, I recognised three social influences that limited CSTIPs' PrEP prescribing.

5.1.2.1 Social influence #1: Negative norms for PrEP use and users

In Taiwan's society, PrEP has been viewed as an HIV prevention measure particularly benefiting MSM. As Taiwan's HIV epidemic is concentrated in MSM, public health messages for upscaling PrEP implementation have focussed on raising awareness of PrEP among gay and bisexual men. For example, in most health education materials produced by medical societies and institutions, PrEP users were characterised as men or male same-sex partners (see Figure 5.2 and Figure 5.3). Although the TCDC avoided using the term 'MSM' in the programme protocols,[29,294] the fact that most PrEP users were male (97%, 2119/2176, in the National Programme from 2018 to 2020)[295(p2)] implied a general perception that PrEP was exclusive to male or MSM users.

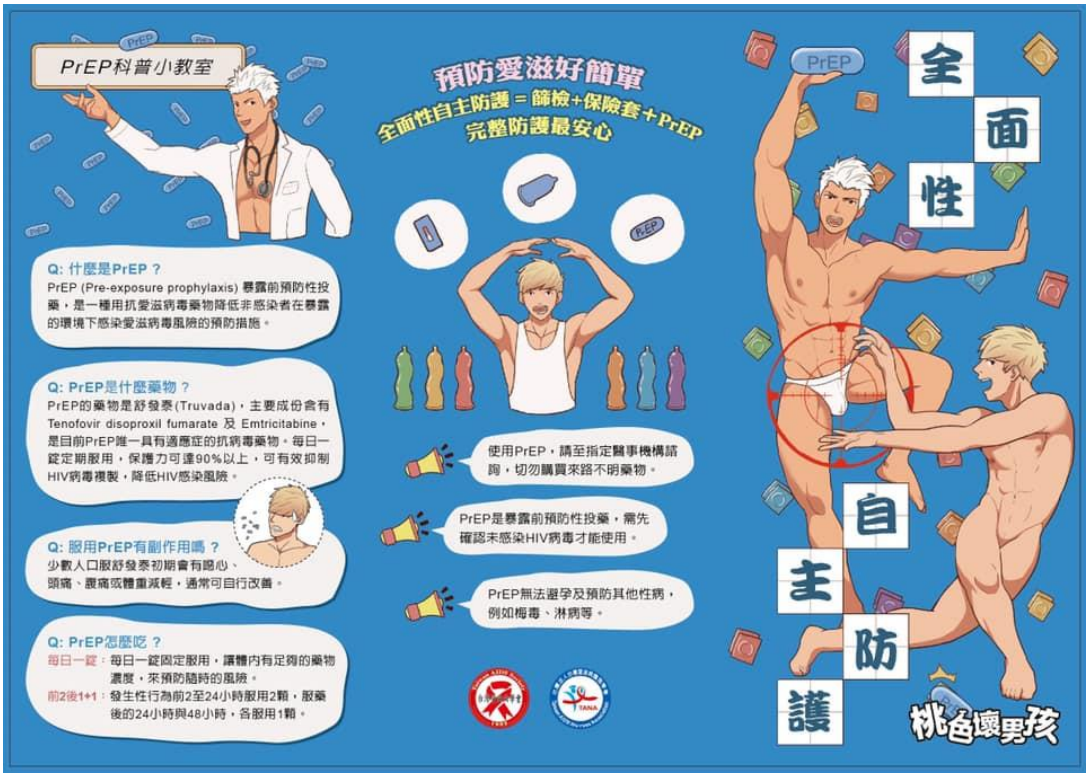


Figure 5.2 Comic brochure as an example of Taiwan's PrEP promotion

Note: Titled as *Comprehensive Autonomous Protection* [全面性自主防護 in Traditional Chinese], the brochure highlighted men's sexual health (e.g., using a red target sign on men's groin area) with descriptions of indications, side effects and modalities of HIV PrEP. Source: Peachy Bad Boy (2019);[296] commissioned by the Taiwan AIDS Society and the Taiwan AIDS Nurses Association.

Figure 5.3 Animated video as an example of Taiwan's PrEP promotion

Note: Titled as *2018 New Modalities of HIV Pre-exposure Prophylaxis* [2018 暴露前預防性投藥的新吃法 in Traditional Chinese], the educational video employed narratives of male same-sex couples to explain on-demand (event-driven) PrEP and discuss both event-driven and daily PrEP modalities. Source: the Taiwan AIDS Society (2018).[297]

The linkage between PrEP and MSM was further consolidated through conservative groups' attacks on PrEP and the TCDC. Since 2017, some anti-LGBT groups have targeted PrEP by linking it to negative images and disseminating disinformation about PrEP to the public. For instance, in July 2017, these groups portrayed PrEP as 'hook-up pills' in a dispute over public advertising for the PrEP pilot programme. Moreover, they characterised a mascot shown in the advertising as male genitalia and condemned the advert as offending public decency, raising widespread concerns across the news media.[298] Some PrEP opponents further alleged that the National Programme could increase drug resistance to HIV while using taxpayers' money for gay men's sexual pleasure. Although the TCDC reiterated its policy that there were comprehensive supporting measures to 'strengthen the attention to safe sexual behaviour in high-risk populations',[299] the opponents have deliberately tainted PrEP negative attributes like 'hook-up pills' in the media.

Appearing simply as a public health intervention, PrEP collides with diverse values, beliefs and prejudices in society. The National Programme commenced around the same time as the movement for the legalisation of same-sex marriage in Taiwan became public. Specifically, the Programme started two months before the first advisory referendum on the legalisation of same-sex marriage in November 2018. There were social forces that sought to spread disinformation to undermine the validity of sexual minorities and their marriage rights. Blaming gay men for HIV epidemics, the opposition groups insisted that expenses on both PrEP and antiretroviral treatment (ART) would devastate Taiwan's healthcare system if same-sex marriage became legal. Such false causality was reinforced by a remark made by then-Premier of Taiwan that 'AIDS is caused not by needle syringes anymore but by male homosexuals.'[300] The TCDC immediately clarified that HIV infection was caused by unprotected sexual behaviour rather than sexual orientation. Nevertheless, the discriminatory linkage between gay men, HIV and PrEP was widespread, followed by a rejection of same-sex marriage in the referendum. Although Taiwan successfully legalised same-sex marriage in May 2019, negative norms attached to PrEP persisted, which further heightened the unmet needs of CSTIPs for PrEP service delivery.

5.1.2.2 Social influence #2: Multi-faceted PrEP stigma

Interview data supported that PrEP stigma (mentioned in Section 2.1.2) was manifested by the social stigma against sexual behaviour, HIV and MSM in Taiwan. PrEP stigma prevented CSTIPs from fulfilling their prescribing needs by creating three barriers in their social interaction: undermining trust in patient-physician relationships, raising conflicts with other

healthcare workers at premises and mitigating the formation of support groups among peer physicians.

First, the stigma attached to sexual behaviour may make physicians passive in taking sexual histories with patients. Sexual stigma included discrediting individuals in non-monogamous sexual relationships and considering STIs as stains on personal reputation. Some interviewees acknowledged their roles in initiating PrEP discussion, but any conflict or discomfort perceived by patients during consultations could result in heightened distrust in patient-physician relationships. A few respondents argued that lack of trust would result in medical lawsuits, the number of which had increased over the last decade in Taiwan.[301] To retain trust between them and patients, some physicians were cautious in clinical consultations by avoiding asking patients sensitive questions, including sexual histories. For example, several interviewees argued that they preferred taking passive roles (i.e., waiting for patient disclosure of sexual complaints) rather than directly asking sex-related questions or offering sexual health education to patients. As a family physician put it:

> I cannot actively ask [patients sexual questions]. I learned at school that I cannot actively ask [because] everyone's feeling is different. If you ask them [sexual questions], they [patients] may be annoyed and say: "Are you? Are you saying I am a promiscuous person?" […]. [We] Orientals, you cannot actively ask [sexual questions] unless they [patients] say yes, they say "I got problems in my private parts", and then you can continue to take [sexual histories]. (I-15, non-prescriber)

This excerpt illustrated how sexual stigma disproportionally suppressed opportunities for PrEP prescribing among CSTIPs avoiding risking their relationships with patients.

Second, stigma against HIV has spilt over to PrEP as an HIV prevention measure. Fear of HIV among other healthcare workers (e.g., nurses and pharmacists) created potential intergroup conflicts at CSTIPs' premises, which may reduce opportunities for PrEP prescribing. While most prescribers reported few conflicts raised by their colleagues, one argued that nurses were uncomfortable in taking blood samples for HIV testing:

> I feel there is no way to solve the problem that [nurses are unwilling to] take blood samples because there are always fears about HIV […]. If there is an HIV patient at your clinic every two or three days for taking blood tests for [HIV], it will affect [nurses' willingness]. Now nurses are trained [for PrEP], so they know the transmissibility of this [HIV] is not high, but what if [they are] pricked? [Nurses would think that]: "I worked here just for little salary; it will be horrible if I get pricked [by needles] once every year!" (I-01, prescriber)

HIV stigma among HIV-negative patients also reduced CSTIPs' opportunities to deliver PrEP services. Some non-adopters worried that the public might misunderstand clinics offering PrEP services as clinics treating HIV-positive patients and that such misunderstanding could reduce visits from non-HIV-infected patients:

> Because when everyone [the public] hears about HIV, they feel it [HIV] is like vipers and beasts. The public still feels so. You tell them HIV is not transmissible [by visiting clinics], they don't believe […]. [If] they know that you are providing HIV [related services at your clinic], they will ponder. Patients will perceive that there is HIV in the clinic […]. They [patients] will say, "I don't want to go there [your clinic] because people with AIDS are often there." Some people [HIV-negative patients] will avoid [visiting your clinic]. (I-13, non-prescriber)

Lastly, the social stigma of gay and other MSM populations was attached to PrEP and PrEP service users. As PrEP has been viewed by the public as a prevention tool exclusive to MSM, existing prejudice and biases against MSM deterred physicians from fulfilling their needs for PrEP prescribing. While some interviewees expressed no difficulties in serving MSM, a few expressed how they generalised MSM with negative personality traits. For instance, a gynaecologist perceived MSM populations as promiscuous and suspicious:

> Homosexuals are very sensitive. Male, particularly MSM, are very sensitive, and their partner [relationships] are very complex, right? Also, many of them are drug abuse[rs], that is, drug addiction […]. What's more, these people are bad-tempered, it's very difficult, very difficult [to communicate with them] from mental aspects. Their loyalty, [MSM] patient's loyalty [to me] is not high [because] they are very paranoid. (I-14, non-prescriber)

Overall, PrEP services did not have a positive public reputation among some interviewees, being ascribed multiple types of stigma. PrEP did not conform with normative ideologies of AIDS-free heterosexual monogamy. This resulted in a dilemma over PrEP service provision: while acknowledging that PrEP would help Taiwan to curb the HIV epidemic, some interviewees worried that promoting PrEP use could disrupt social norms for relationship and sexuality. A prescriber illustrated the dilemma when commenting on the National Programme:

> PrEP, this kind of thing, how can you push up the number of [users]? Pushing up the number means our society somehow gets wrong, so PrEP users should be as few as possible. I hope that the number [of PrEP services] is few as well, but few [services] mean that no one will pay attention to it [PrEP for public health]. (I-07, prescriber)

When asked about measures for tackling PrEP stigma, some interviewees suggested that government and medical societies should provide CSTIPs with more educational sessions to break the stigma. Others contended that opportunities could be created if governments and medical societies held educational events for the public other than physicians. Viewing patient demand as key opportunities for PrEP delivery, some interviewees urged policymakers to raise public awareness of PrEP. As one prescriber highlighted:

> Instead of holding so many sessions [of continuing medical education], there should be several bigger events, something like carnivals, for the public. You can incorporate it [PrEP] into more positive themes. Don't let others misinterpret or stigmatise it [PrEP] as, for instance, "this [PrEP] is all for HIV groups, for gay groups, etc." It [PrEP] can be more positive [as] something like the concept of family. I feel that the effects of this [public event] would be much greater than continually [educating] physicians. Many healthcare workers knew PrEP after [attending] many sessions, and so what? Information [on PrEP] is still not disseminated [to the public]. I feel [educating] the public is very critical. (I-16, prescriber)

The accounts underlined the importance of reframing the message of PrEP as benefiting all populations as well as normalising PrEP through public educational events. Such implications are discussed in Chapter 8.

5.1.2.3 Social influence #3: Lacking norm of PrEP prescribing in medical societies

Views from interviewees were diverse as to whether other physicians supported PrEP prescribing. Proponents argued that experiences shared by existing PrEP providers were key to their PrEP service delivery. For example, when facing challenges in PrEP case management, some providers would consult ID specialists and experienced peers at PrEP training sessions or through personal contacts. The peer support appeared to be more person-to-person than group-based as none of the interviewees identified any support group designated for PrEP providers. Opponents argued that peer influences could not create a norm of PrEP prescribing owing to perceived power asymmetry between junior and senior physicians in their medical societies. Considering the following quotes from a urologist PrEP provider:

> Some very senior doctors are unwilling to prescribe PrEP because they feel doing so will bring them patients from specific groups […]. I feel it is hard [to change senior doctors' minds] because most of them are very senior and high-level doctors. It is very difficult to influence them. (I-06, prescriber)

In other words, some interviewees found it difficult to create a norm of PrEP prescribing in their specialist societies, which left their needs for opportunities unsatisfied.

5.2 Restricted capabilities

While capability covers both physical and psychological aspects, the four areas of unmet need identified in the interviews were related to the psychological capability of CSTIPs. None of the interviewees considered the physical capability (e.g., technical skills for performing HIV testing) as their PrEP prescribing needs.

5.2.1 Psychological capability #1: Varying extent of knowledge about PrEP

All interviewees were asked whether they had heard of PrEP and from what sources they obtained such information. This was to assess the extent of PrEP knowledge among interviewees before the study. For respondents saying they had not heard of PrEP, the researcher gave prompts (e.g., taking anti-HIV pills orally to prevent HIV infection) to help respondents recall their memory. If interviewees did not react to the prompts, the researcher explained PrEP to them before asking about their perceived needs.

The extent of knowledge of PrEP among respondents varied greatly despite their certification as 'STI-friendly physician' (STIP). Not surprisingly, PrEP prescribers were more knowledgeable about PrEP than non-prescribers. There was marked diversity of information sources of PrEP, ranging from training sessions of STIP held by medical societies (to which most interviewees referred), official letters sent by local PHBs or the TCDC, other experienced physicians and representatives of pharmaceutical companies. Documents also showed that education materials of PrEP have been incorporated into certificate programmes since 2016.[302,303] The majority of prescribers had comprehensive understandings of PrEP, such as indications, modalities (both daily and event-driven PrEP), side effects and contraindications. Not knowing MSM populations were eligible for event-driven PrEP, two prescribers argued that daily PrEP was the only effective modality for both male and female users. Among non-prescribers, most had heard of PrEP, but few were able to describe its pertinent features clearly. Of the two family physicians expressing no awareness of PrEP, one recalled basic knowledge of PrEP after being prompted. Another addressed a lack of capability, being totally unaware of PrEP prior to the interview:

> YHC (the researcher): Have you heard of pre-exposure prophylaxis for HIV before?
>
> I-09: Prescribing medicine [to patients] before exposure to HIV? I really don't understand.
>
> (YHC explained the basics of PrEP to I-09)
>
> I-09: I just realise this after your explanation. I never knew that it [anti-HIV medication] can be used in this way [to prevent HIV infection]. (I-09, non-prescriber)

This example indicated that some CSTIPs required information on and knowledge about PrEP.

In addition to the lack of information on PrEP, the interviews also uncovered physicians' needs for knowing the National Programme. Half of the prescribers and all the non-prescribers expressed limited knowledge of the TCDC-led National Programme. For instance, some prescribers misunderstood it as the Patient Assistance PrEP (PAP) programme by pharmaceutical companies. Most non-prescribers were not aware of the National Programme and requested more information from the researcher in interviews, so they could better describe their prescribing needs in the Programme. Not knowing the TCDC's regulations on PrEP provider registration, one non-adopter insisted that physicians working at private clinics were ineligible for PrEP prescribing:

> So let me tell you, the biggest problem of this [National PrEP Programme] is that we [physicians at clinics] cannot prescribe it [PrEP]. If you ask us to give prescriptions, we cannot prescribe [HIV] prevention medicine! (I-05, non-prescriber)

This excerpt showed that, despite knowing PrEP, some CSTIPs held incorrect procedural knowledge about the eligibility and content of the National Programme.

5.2.2 Psychological capability #2: Multiple skills involved in PrEP service delivery

To successfully provide PrEP services to MSM, physicians needed to equip themselves with various skills at each step of service delivery. These skills included: risk assessment (taking sexual histories and identifying high-risk individuals), communication (explaining PrEP services with patients during consultation), techniques of blood sampling (for HIV and renal function tests), interpreting laboratory results, dispensing PrEP tablets and tracking users' adherence to PrEP.

Reported unmet needs concentrated on interpersonal skills rather than physical techniques. When asked if they knew how to collect blood samples, no interviewees regarded drawing blood as a challenge. Specifically, some interviewees addressed their competency in taking blood samples from patients, while others argued that such work is assigned to nurses at practices who fulfilled their needs. Nevertheless, a lack of interpersonal skills was recurrent throughout the data. One non-prescriber addressed difficulties in persuading nurses into collecting blood samples due to HIV stigma. Another prescriber (I-04) commented that non-prescribers could experience double setback when they were 'unfamiliar with PrEP and rejected by nurses for collecting blood samples'. Others reported difficulties discussing co-payment incurred from the National Programme (e.g., around 900 TWD per month) with

patients. Using an analogy of antibiotics prescribing (approximately 200 TWD per course), a urologist in cognitive interviews highlighted such communication difficulties:

> Four [antibiotic] pills cost only 200 TWD altogether, [but] sometimes patients regarded this [expense] as a [financial] burden, so they won't consider this kind of self-paid healthcare. Imagine they don't want to pay 200 TWD out of pocket; when you say they are at high risk of STIs, they are probably at [higher risk of] HIV. In theory, we should ask [them about PrEP]. But [in practice], how can I persuade them into [considering] PrEP as an [HIV prevention] option if they wouldn't pay 200 TWD out of pocket? (S-08, non-prescriber)

This account indicated that providers' barrier to PrEP prescribing was not actual objection from users but their anticipated unaffordability of PrEP for potential users.

5.2.3 Psychological capability #3: Memory, attention and decision processes

Among interviewees who had heard of PrEP, the majority highlighted their needs for remembering how to deliver PrEP services. Some attributed it to the lack of opportunities because none or few patients had ever asked them about PrEP. One non-prescriber suggested that a clear and simplified standard of procedure would help recall the process of PrEP delivery. Nevertheless, a prescriber argued that potential benefits of standardised procedures could be overshadowed by the lack of PrEP cases in their daily practices:

> I often apply for [specialised treatments subsidised by governments], and I am fine whenever I was rejected or requested for additional reviews. But I am not willing to [join the National Programme] because it [PrEP] is once in a blue moon, you know? So, I just forget, forget [what to do]. This [remembering PrEP service process] is a burden to me because my memory was not so good. (I-04, prescriber)

This example informed that providers needed a simpler way to recall how to provide PrEP services, which might be rarely requested by their patients.

Lacking patient demand as stimuli (described in Section 5.1.1.4), physicians may forget how to prescribe PrEP and thus leave PrEP outside their decision-making in daily clinical routine. Specifically, the mutual reinforcement between diminishing memories for PrEP services and no patient demand could create a vicious cycle that heightened physicians' unmet needs. This perspective was echoed by a non-adopter in cognitive interviews who described this situation as 'the chicken or the egg' dilemma:

> This is "the chicken or the egg" problem. First of all, do you have this kind of patients [who need PrEP]? If not, you definitely won't do it […]. You don't provide it [PrEP services to patients] for so long that you forgot [what to do]. Moreover, you can't

> keep stockpiling medication [without patient demand]. In fact, this is a bit like [the question]: Which is the cause? Which is the effect? (S-07, non-prescriber)

Together with the previous excerpt from I-04, this remark illustrated how the lack of opportunity may diminish physicians' capability (i.e., forgetting how to provide PrEP services). I discuss the mutual effects between opportunities and capabilities in Chapter 8.

5.2.4 Psychological capability #4: Behavioural regulation

Both documents and interviews revealed that CSTIPs needed structural systems to monitor PrEP service delivery. The National Programme set up a system to monitor providers' PrEP prescribing behaviour as well as their performance. Documents showed that the TCDC employed two measures.[29,284] Firstly, reimbursement was contingent on annual performance evaluation. Providers would not get case-based financial rewards unless they submitted a project achievement report to the TCDC by the end of the year. The report requested providers to outline their PrEP service performance using specific indicators, such as the expected and actual numbers of PrEP users, numbers/proportion of user dropout and HIV seroconversion and root-cause analyses of failure (i.e., user dropouts and seroconversion). Secondly, the TCDC applied a weekly reporting system to increase users' adherence. After several seroconverted individuals were notified in early 2019, the TCDC had requested all users in the Programme to report their PrEP adherence online every week. Individuals not reporting for seven consecutive days or not returning to clinics for 120 days would be dropped from the Programme.[284] Given that the number of dropouts would impact the amount of reimbursement as well as the results of service performance, prescribers needed effective case management systems to monitor their service users' adherence.

Interviewees pointed out that team-based management could fulfil their needs for delivering PrEP services in the National Programme. Adopters established case management systems by collaborating with other health professionals at their clinics and/or using electronic communication tools as appointment reminders. For example, both prescribers in the National Programme highlighted the key roles of their nurse colleagues as case managers, health educators and facilitators for patient follow-up. This view was echoed by some non-adopters as a practical way to manage PrEP services. In addition, one prescriber viewed electronic communication applications (e.g., 'LINE', a communication application commonly used in Taiwan) as facilitators to service management. This prescriber argued that using the LINE application enhanced efficiency in PrEP service delivery and monitoring by reminding users of their self-report adherence and next revisits to the clinic.

5.3 Limited motivation

Compared to opportunity and capability, motivation entailed the greatest diversity of needs perceived by CSTIPs to deliver PrEP services to MSM. A marked lack of reflective motivation and limited automatic motivation are described in the following sections.

5.3.1 Reflective motivation #1: Belief about consequences

5.3.1.1 Consequences for the MSM population

All interviewees expressed their concerns about the potential consequences of PrEP prescribing as well as PrEP service delivery, underlining three main issues. The first concern was that PrEP could change users' behaviour by increasing the frequency of condomless sex as well as the number of sexual partners. Although the TCDC has promoted PrEP as a measure for HIV prevention in addition to condoms, there was a sense among most interviewees that PrEP and condoms were mutually exclusive. There was a recurrent concern that PrEP could make MSM individuals abandon condoms and have more sexual partners. As one prescriber commented:

> I often tell patients who are [HIV-]negative that [they] should not continue doing this [having sex with random people] and that [they] should keep regular [sexual partners]. In fact, everyone has fear of HIV; they [patients] are scared. But [when individuals] have this [PrEP] pill, [they] will feel that "I have great immunity to HIV as long as I take it [PrEP] adherently. I can [do whatever I want], and it doesn't matter." They [users] will become more daring, probably more diverse in terms of the diversity in sexual behaviour. (I-03, prescriber)

The second concern was that condomless sex among PrEP users would increase the incidences of other STIs in Taiwan (e.g., syphilis, gonorrhoea and human papillomavirus). Some interviewees considered the benefits of PrEP for HIV prevention outweighed a potential increase in the number of other STIs, given the latter were curable. Others subscribed to the idea that such a consequence would result in unacceptable STI epidemics. For example, a urologist argued:

> [I] hope not [to find that users] do not use condoms or conduct unsafe sexual behaviour after [I] prescribe this medication [PrEP]. Because PrEP can only prevent HIV [infection], it cannot prevent so-called gonorrhoea, syphilis and condyloma! So I feel safe sex is better than PrEP, I always think so […]. [Patients] could think that "maybe I can [have sex] without using condoms because I have taken PrEP". I am

> scared that this kind of idea will spread out. If so, it [the STI epidemic] will become uncontrollable in the future. More STIs will emerge. (I-07, prescriber)

The third concern from physicians was a belief that PrEP could induce drug-resistant HIV strains. Although this claim is not substantiated by scientific evidence as well as Taiwan's national PrEP guideline, a few interviewees believed that the frequent use of PrEP among high-risk populations, particularly those being HIV-positive without knowing their status, could potentially increase the prevalence of HIV drug resistance. Holding a different perspective, a prescriber disagreed with the claim for drug resistance by stressing that PrEP is only dispensed to HIV-negative individuals.

5.3.1.2 Consequences for service providers

Three consequences of delivering PrEP in the National Programme were identified for service providers. The first was extra paperwork. As government-funded providers were requested to submit project achievement reports with indicator-based results to the TCDC, non-prescribers and self-paid PrEP prescribers perceived the Programme as time-consuming and burdensome. One self-paid PrEP provider explained:

> I am not against this [national PrEP] programme, but because the government-funded PrEP requires some forms, for example, maybe we need to pay in advance, I am not sure. Presumably we need to pay [for the pills] first and get money back [from governments] or do something like that. I feel it's too bothersome, so I would not like to join [the] government-funded PrEP [programme]. (I-04, prescriber)

The second issue centred on potential disputes over the governments' medical claims review. Like Taiwan's National Health Insurance (NHI) system, the TCDC was the only point of contact for government-funded PrEP providers to claim expenses. Although no evidence from document analyses showed that the TCDC would audit physicians' PrEP prescribing behaviour, some interviewees believed that the TCDC could potentially conduct medical claims reviews of their PrEP services. Analogising the PrEP services to other services reimbursed by the NHI, interviewees argued that PrEP services could be subjected to governmental audits, which could result in reimbursement claim denials. One family physician stated the belief that potential audits prevented non-adopters from joining the National Programme. Taking experiences in government-funded HIV screening projects as an example, a gynaecologist contended that medical claims review was the key barrier to registering with governmental programmes:

> [Previously] our [reclaim for HIV screening expenses] was denied [by governments] without rhyme or reason. No reason. It's like you help them [governments] so much by collecting samples for HIV [testing]. We followed standards by collecting patient consent with signatures, but [our reimbursement claim was] denied […]. I feel there is no chance to appeal. You [the governments] just rejected me […]. Now I would rather die than do it [commissioning HIV screening services]! I don't know why my [claim] was denied. No clues. There is nowhere to dispute. (I-05, non-prescriber)

The third issue was the lack of consequence for physicians not registering with the government-funded PrEP programme. Interestingly, when asked what would happen if they did not provide government-funded PrEP services, most interviewees claimed that users could access PrEP from private programmes instead (i.e., the PAP and PAPA programmes introduced in Section 2.3.3). Table 5.1 compares the National Programme with the PAP and the PAPA programme from 2018 to 2020.

With various types of programmes for PrEP service delivery, physicians may lack motivation for joining the governmental programme. Among non-prescribers, there was a sense that PrEP services were always available at other medical institutions. Hence, the potential consequences of their inaction in PrEP provision would be offset by existing PrEP providers. For example, non-prescribers would inform or refer patients requesting PrEP to government-funded providers rather than delivering PrEP on their own.

Among prescribers, opinion about the consequences of not delivering government-funded PrEP services was more diverse. Some providers acknowledged that the government-funded PrEP was essential to individuals who could not afford self-paid PrEP. Hence, they regarded both the PAP and the PAPA programmes as complementary options for self-sufficient individuals to access PrEP. Other providers would compare the pros and cons of each programme from an economic perspective by valuing the costs and revenues derived from service provision. Financial benefits of various PrEP programmes are described in Section 5.3.7.

Table 5.1 Comparison of PrEP programmes in Taiwan, 2018-2020

Name	**TCDC National PrEP programme**	**Patient Assistance PrEP programme**	**Provider-Assisted PrEP Access programme**
PrEP source and type	Government Patented (Truvada)	Private (Gilead) Patented (Truvada)	Private (overseas clinic) Patented (Truvada) or Generic (Teno-Em or Mylan)
Period	Sep 2018 – Dec 2020	May 2019 – Dec 2020	Aug 2017 – Dec 2020
Provider aspect			
Authorised provider	Yes	Yes	Yes
Administration involved	○ Proposal submission ○ Signing contracts with the TCDC ○ Liaison with PHBs and the TCDC ○ Log files of user lists ○ Annual report	○ Invoice of self-paid PrEP (buy-1-get-2-free) ○ Copy of prescription ○ Copy of users' self-paid consent	○ User identity-check ○ Copy of prescriptions ○ Copy of laboratory results
PrEP case management	Compulsory. Contingent reimbursement by the TCDC	Not compulsory	Not compulsory
Source of service income	Governmental reimbursement	Pharmaceutical companies	Private business entities
User aspect			
Access	38 medical institutions	84 medical institutions	14 medical institutions
Eligibility criteria (in addition to HIV-negative)	Aged 18-30 *or* Individuals in serodiscordant relationships	Aged 18-34 *or* Monthly income less than 36,600 TWD	Not specific
User co-payment per month* (TWD)	Approx. 900 PrEP cost: 0 Service charge per month: ~900	Approx. 4500 PrEP cost: 3450-4200 Service charge per order (3 bottles): 1700	Approx. 1766 or 4666 Generic PrEP: 1400 Patented PrEP: 4300 Service charge per order (3 bottles): 1100
Summary	Free PrEP pills with the most amount of paperwork and limited revenues Most affordable for users	Less paperwork and highest revenues than *National Programme* Least affordable for users	Less paperwork and higher revenues than *National Programme* Less affordable for users

* Calculated based on one PrEP pill daily and 30 pills per bottle. Source: Adapted from LoveMyself.[137] PrEP: pre-exposure prophylaxis; PHB: public health bureau; TCDC: Taiwan Centers for Disease Control; TWD: New Taiwan Dollar (1 TWD equivalent to 0.025 Pound Sterling).

5.3.2 Reflective motivation #2: Social/professional role and identity

The professional roles and identity of physicians were relevant to PrEP prescribing in three aspects. The first aspect was that some CSTIPs do not regard PrEP service provision as part of their professional role. Based on the historical context (described in Section 5.1.1.1), PrEP is sometimes considered as a service delivered by ID specialists. Thus, CSTIPs could worry about their invasion into ID specialists' clinical territory. A prescriber reflected on crossing the perceived professional boundary between specialities:

> Because we are not [PrEP] professionals, I ask infectious disease [specialists] everywhere […]. I feel that I was not above asking questions [about PrEP]. Indeed, they [infectious disease specialists] know it [PrEP] way more than us [urologists]. Yes, well, we [urologists] are going to "eat their field" [Notes: poach clients from the business of infectious disease specialists]. (I-03, prescriber)

The second aspect was how CSTIPs perceived their professional identity, which varied with specialities. Among the interviewees, most non-urologists regarded PrEP outside their remit, while some urologists considered PrEP as part of clinical expertise. According to urologists interviewed, such identity could be ascribed to two facilitators: the wider promotion of PrEP services within the Taiwan Urological Association and the fact that most PrEP adopters (including the two CSTIPs in the National Programme) were urologists. For example, an adopter contended that PrEP prescribing aligned with the professional identity of urologists:

> Because we are urology specialists, we must emphasise our professions, our diverse and professional services. To emphasise that I am a [PrEP] professional, I must be able to [do] PrEP and PEP […]. If I don't do these [PrEP services], I am not qualified for my clinical signboard called urology specialist clinic. It is self-demand in my professional pursuits. (I-04, prescriber)

The third aspect centred on conflicts between physicians' professional identities and their professional boundaries with MSM clients. Specifically, there were two types of conflicts underlining CSTIPs' unmet needs for professional competence. Firstly, due to the widespread influence of PrEP stigma (described in Section 5.1.2.2) on PrEP services and service users, physicians' prejudice on MSM may override their professional roles, which therefore affected their clinical behaviour. Although the code of medical ethics did not allow physicians to conduct any kind of discrimination against specific genders or sexual orientations, some providers pointed out that other CSTIPs would not welcome MSM clients seeking sexual health services due to their personal biases. This issue was echoed by a non-adopter who expressed personal prejudice against MSM clients as well as PrEP:

> [I]n my opinion as a healer, I think it is very good, this pre-medication [PrEP]. Of course, the simplest principle overall, a simple sexual relationship is the best way [for HIV prevention]. Taking medication is when you have no choice; [it is] the means at the most inferior, the lowest level, right? The ultimate prevention is a simple sexual relationship. What's more, I am not, not against homosexuals or whatsoever, [but] I think that homosexuality is a kind of abnormal sexual relationship, abnormal sexual relationships between two people […], so I don't engage this kind of patients [MSM]. (I-14, non-prescriber)

Another conflict in professionalism happened when CSTIPs crossed their professional boundaries at consultations with PrEP users. Although it was less recurrent throughout the data, the conflict was revealed when interviewees tended to indoctrinate MSM requesting PrEP to reconsider or to change their minds on taking PrEP. Believing that PrEP users were at greater risk of contracting HIV than condom users, a prescriber addressed experiences in persuading MSM clients into condom rather than PrEP as follows.

> When patients want to take this medication [PrEP], I always have a deep conversation with them. I always say: "Why must you do so [taking PrEP]? For ordinary men and women, we can accept using condoms or contraceptive pills for women. You [MSM] can be just like us, so why are you thinking not to use [condom]?" […]. When these [MSM] clients come to me, I will persuade them not to use [PrEP]. They should not use [PrEP] again in the future. This is my endeavour. I wish it [PrEP] could just disappear because it is more aligned with my morale. Secondly, it [not taking PrEP] meets the commitments to taking care of our bodies. There are still risks of [contracting HIV after taking] PrEP, right? (I-04, prescriber)

The remark also implied that condom and PrEP use were deemed mutually exclusive. I articulate the issue of how personal prejudice interacted with medical professionalism and evidence-based practices in Chapter 8.

5.3.3 Reflective motivation #3: Beliefs about capabilities

Two discrete needs of CSTIPs for believing in their competence emerged from the interviews. The first aspect centred on the lack of confidence in PrEP prescribing. This issue was repeatedly mentioned by non-adopters as an unmet need for PrEP delivery. Although physicians had heard of PrEP and had chances to become PrEP providers, they may lack confidence in some activities of the PrEP care, such as answering patients' questions about PrEP and assessing the eligibility of PrEP users. Talking about a general lack of confidence in PrEP prescribing among non-adopters, a family physician commented:

> If we want to, to join this [national PrEP programme], at least [we] must persuade ourselves that we have a proper understanding of this programme, so we are more likely to persuade our patients […]. Otherwise, after you [physicians] have left school for such a long time, there are huge gaps between knowledge and practices. Since we have graduated from schools for a while, continuing education is a must if we want to build self-confidence [in PrEP prescribing]. (I-12, non-prescriber)

This view of lacking confidence was echoed by prescribers who described experiences in gaining confidence about delivering PrEP to MSM. While some prescribers enhanced their confidence by discussing PrEP services with supportive peer CSTIPs, others were empowered to service their clients with the support of ID specialists. One urologist argued that clinical backup from ID specialists was crucial to boosting self-confidence in PrEP service provision:

> He [an infectious disease specialist] explained it [ways to provide PrEP services] very clearly, which made me feel I was in the right direction at the beginning. At that time, I prepared two kinds of medication, so I can do it well in the two scenarios: PrEP and PEP. [He] makes me have confidence in keeping doing [PrEP and PEP]. So, I feel that [CSTIPs] need to find a nice consultant. Whenever I have questions, I ask him. No matter what situations I face, I ask him as well. (I-03, prescriber)

The second need was related to the perceived competency of CSTIPs for PrEP prescribing. When asked if providing PrEP services were difficult, a non-prescriber pointed out that physicians' learning curve for PrEP service may determine how they perceived their confidence. Given there was little demand for PrEP from patients with STIs, physicians would need more time to feel experienced in and competent for PrEP service delivery. Comparing PrEP for HIV with prevention of latent tuberculosis, a family physician discussed how to gradually acquire competence for service provision in a learning-by-doing process:

> [It relates to] the learning curve of us as physicians. Previously, we had little chance to know this kind of medication [PrEP] […]. But I know, in reality, things will go well [by] doing more PrEP services. It's like our services using drug administration to prevent latent tuberculosis infection. I feel both [PrEP and latent tuberculosis treatment] are not difficult. But the prevalence of tuberculosis [is higher], in my imagination, the number of patients [with latent tuberculosis] I have seen is probably way more than those requesting PrEP. (I-11, non-prescriber)

5.3.4 Reflective motivation #4: Optimism

Lacking optimism in PrEP, as well as the National Programme, were recognised from the interviews. Regarding the impact of PrEP on Taiwan's HIV epidemics, some interviewees believed that PrEP would contribute to a continuing decrease in the incidence of HIV infection, which would therefore make Taiwan become a successful example of Ending AIDS by 2030 regionally and globally.

Nevertheless, other physicians were pessimistic about the impact of PrEP on disease control. They believed that the TCDC would terminate the National Programme sooner or later once private PrEP programmes (i.e., PAP and PAPA) became more established and affordable. Had this happened, providers worried that some PrEP users in the National Programme would never take PrEP again due to affordability issues and low awareness of HIV risks. One provider expressed fatalistic views that the Programme may not raise users' awareness of either HIV or sexual health:

> I feel this [National PrEP Programme] can only be short-term or an initiative. In the long run it relies on patients' self-awareness, which I think is very crucial […]. Of course, today when [users are] offered free [PrEP], their awareness [of HIV] will more or less increase. But after all, [the Programme] cannot subsidise them forever, [but for] only half a year or one year. When the Programme ends, users need to rely on themselves; and they, in my opinion, they will slip back into their old ways. They [users] won't think, "I need to actively do this kind of [PrEP] prevention [for HIV]" just because [they had participated in the national programme]. (I-16, prescriber)

This example showed that physicians required optimism about the sustainability of the National Programmes and about the impact of the PrEP services at individual and community levels.

5.3.5 Reflective motivation #5: Intentions

A general lack of intention for delivering government-funded PrEP to MSM was uncovered. Among CSTIPs who had never prescribed PrEP, the majority did not plan to deliver PrEP services by themselves, while few reported that they might consider registering with the National Programme after assessing patient demand. Such inertia in change could result from the unmet needs of non-adopters for both opportunities and capabilities. For instance, two family physicians mentioned they would consider delivering PrEP only if there were foreseeable and sustainable demands on PrEP.

Also, self-paid PrEP providers were not motivated to apply for the National Programme. Some argued that they did not hold any ambition to promote PrEP but saw PrEP as a service to increase the revenue of their clinics. Others expressed no intention for PrEP prescribing if the administrative process of the National Programme remained unchanged. They also mentioned a lack of interest in developing relationships with new MSM clients potentially taking PrEP. Instead, some physicians preferred to maintain relationships with existing patients by focusing on other sexual health services. As a result, the needs of CSTIPs for taking the initiative in delivering government-funded PrEP were unsatisfied.

5.3.6 Reflective motivation #6: Goals

Perhaps unsurprisingly, most interviewees had not set goals for delivering PrEP services. Three issues emerged from the data. First, non-prescribers were not motivated to regard the PrEP service as part of their career goals. Specifically, given that CSTIPs comprise physicians from several specialities, their career goals may not align with HIV prevention. Interviewees holding this view argued that they had positioned their clinics by developing non-HIV-related services with huge markets in Taiwan, such as care of chronic conditions or elective surgeries. The non-alignment between PrEP and physicians' career goals resulted in a lack of motivation.

The second issue referred to an absence of action planning for delivering PrEP services to MSM. As non-prescribers had little intention for PrEP prescribing (described in Section 5.3.5), they did not tend to set up concrete plans for implementing PrEP services. Similarly, self-paid PrEP providers may not plan to register with the National Programme. Some interviewees argued that the publicly funded PrEP had little profit potential. Others argued that the National Programme was a pro-bono public health service without sustainable revenue that benefitted physicians themselves and the operation of their clinics.

The last issue was whether physicians would set 'ending HIV epidemics' as part of their professional goals. When asked what motivated them to deliver government-funded PrEP services to MSM, both prescribers expressed their goals of improving public health. One provider (I-03) mentioned that promoting PrEP was like 'placing the last puzzle piece' of Taiwan's HIV prevention. The other addressed that delivering PrEP under the National Programme was beneficial to everyone in the society by accelerating the end of AIDS epidemics. Overall, the lack of goal setting as delivering PrEP for public health was recognised as an unmet need of non-prescriber CSTIPs.

5.3.7 Automatic motivation #1: Reinforcement

Two types of reinforcement, financial incentives and psychological rewards, were identified as CSTIPs' needs for delivering PrEP services. Firstly, interviewees argued that there were no profits from government-funded PrEP services. Some physicians argued that the return-on-investment of the National Programme was lower than other services provided at their clinics. This was echoed by a urologist who regarded profits of PrEP services as the key motivator:

> Medical care is a business activity. Medical care is for making profits, but you can serve others while you are making money. Of course, money is a reward […]. Suppose you do this [PrEP service] as a philanthropic act by spending much time in either administrative work or health education without getting any profit. In this case, I reckon it's impossible to promote this [PrEP] medication or this service. Ninety-nine percent of doctors will never do it [PrEP service]. (S-08, non-prescriber)

This illustration supported the findings that the profit of services was key to CSTIPs' motivation for PrEP prescribing. According to the protocols of the National Programme, the TCDC provided various incentives to the physicians, including administration, maintenance of information technology systems, HIV testing and cash bonuses for case management (i.e., 1600 TWD per case per visit).[29,284] There seemed to be a discrepancy between interviewees' perception of and the TCDC's policies on incentives for PrEP delivery.

Although reimbursement for PrEP services existed, interviewees' perceived incentives were not based on an absolute amount of money but relative valued rewards. Specifically, physicians would compare the profits from the government-funded PrEP with those from other self-paid sexual health services. For example, some non-prescribers pointed out that the amount of reimbursement from the National Programme was much less than the profits they could gain from elective surgeries, which was critical to the financial management of their clinics. Others argued that the relatively low extent of profit and few demands on PrEP prevented them from delivering PrEP services at their practices.

In addition, the fact that the TCDC subsidised self-paid PrEP providers could make physicians less interested in the National Programme. Striving to upscale PrEP implementation nationwide, the TCDC adopted a policy to reward physicians delivering self-paid PrEP services from 2018 to 2019. The TCDC offered CSTIPs who successfully delivered self-paid PrEP services a 10,000 TWD bonus for their first case, followed by a 4000 TWD bonus per case per annum.[302] Since providers could get similar governmental

bonuses by delivering self-paid or government-funded PrEP, physicians interested in PrEP care delivery might prefer joining private programmes (e.g., PAP and PAPA models) rather than the National Programme.

Secondly, some interviewees needed to gain psychological rewards from prescribing PrEP to MSM. As the National Programme is public health-oriented rather than profit-driven, prescribers considered the sense of achievement from service delivery as a crucial need for PrEP prescribing. When asked about what motivated them to deliver PrEP services to MSM, prescribers expressed a sense of achievement by successfully preventing at-risk populations from acquiring HIV, which was ultimately beneficial to Taiwan's society. They regarded experiences in PrEP service delivery as useful lessons for promoting other services to MSM clients and increasing the visibility of their clinics.

5.3.8 Automatic motivation #2: Emotion

Physicians' emotional responses to PrEP prescribing were identified in three aspects. Firstly, among non-prescribers, there was a sense of *embarrassment* in asking patients about their sexual histories. Influenced by the social stigma attached to sex and HIV, some interviewees found it difficult to cope with the uneasiness between them and patients who might be reluctant to disclose their sexual histories. Secondly, CSTIPs would feel *impatient* in dealing with paperwork and administrative procedures involved in PrEP services. When asked how they felt about the National Programme, some interviewees expressed annoyance due to the anticipated amount of paperwork involved in service registration, case management and performance reporting. This view was echoed by a family physician (I-11) who described dealing with the administrative process as very *irritating* (煩 *fán* in Traditional Chinese). Both negative emotions were recognised as barriers to delivering PrEP services to MSM.

Thirdly, an emotion that could facilitate CSTIPs' PrEP prescribing behaviour was an act of *compassion* on MSM populations. Such compassion referred to physicians' perception that PrEP could prevent MSM from the irreversible consequences of HIV infection. For example, when asked about the motivation for PrEP delivery, an adopter (I-03) argued that 'I did not have the heart to inform patients of their HIV infection when they could have used PrEP to prevent seroconversion.' One non-adopter (I-13) contended that the key characteristic of PrEP providers was enthusiasm in public health. In summary, both holding compassion for MSM and reducing negative feelings derived from clinical activities could motivate CSTIPs to deliver PrEP services.

5.4 Chapter summary

Overall, this chapter presented the findings to meet both Objective 1 and Objective 2 of this study. For Objective 1, Section 5.1 delineated the political and social contexts of the National Programme. The policy context of the Programme was related to Taiwan's centralised HIV care system and the hierarchal dynamics among the TCDC, local PHBs and CSTIPs as the representative of private clinics (Figure 5.1). The same section then illustrated the social environment where the National Programme operates. The findings highlighted a linkage between PrEP and MSM users perceived by the Taiwanese public and how such linkage transformed into PrEP stigma amid heated societal debates on the legalisation of same-sex marriage from 2018 to 2019.

Regarding Objective 2, what CSTIPs require to prescribe PrEP to MSM was identified using the COM-B/TDF model. Needs were identified in all 14 TDF domains and the three COM-B components. Section 5.1 revealed what contextual factors prevented CSTIPs from gaining opportunities for PrEP service delivery. Section 5.2 and 5.3 described how CSTIPs regarded themselves as being unable to or unmotivated to provide MSM with PrEP. Types and the extent of unmet needs varied between PrEP adopters and non-adopters. The findings also reveal that behavioural components and TDF domains are interdependent with reciprocal effects.

Together with interviewees' suggestions on need fulfilment, the identified lack of opportunities, capabilities and motivation contributed to questionnaire development for measuring the needs of CSTIPs for PrEP service provision. I report methods and the results of survey development in the next two chapters.

Chapter 6 Phase Two Methods: Survey Development

6.1 Rationale

Following qualitative exploration in the formative phase, a quantitative inquiry would measure what CSTIPs most require for PrEP service delivery. Identifying the commonality of CSTIPs' needs would help design needs-based recommendations to improve PrEP implementation in Taiwan. Due to limited resources and time for the DrPH thesis, I decided to adopt the survey method to efficiently quantify the unmet needs of my target population.[283,304] Among all types of surveys in social science, I chose to develop a questionnaire that statistically analyses individuals' answers to each structured questions.[34,304]

During my critical review in Chapter 2, I concluded that no studies have investigated physicians' needs for PrEP service provision in Taiwan. To advance frontline knowledge of needs assessment, I developed a theory-informed questionnaire in Traditional Chinese tailored to the contexts of PrEP service provision in Taiwan. Based on suggestions given by my DrPH Review Panel, a questionnaire developed through theory-informed procedures was the outcome to achieving Objective 3. The steps of survey development are introduced in the following sections.

6.2 Overview of questionnaire development

While there is no universal principle for questionnaire design, I adapted the guidance on scale development suggested by DeVellis[305] as it laid the foundation for building theory-informed measures from the findings of formative qualitative research.[283(p194)] Although the questionnaire aimed to measure physicians' needs rather than being a psychometric scale for testing specific constructs, my consistent application of the COM-B/TDF model throughout the study made the questionnaire design theoretical by default. Thus, DeVellis' eight steps[305] to creating theoretical measures/scales functioned as appropriate references for my questionnaire design. To avoid 'reinventing the wheel',[306(p47)] I decided to revise DeVellis' suggested procedure by consulting existing validated items before generating a repository for items. Thus, the revised eight steps for my survey development were:

Step 1. Identify what to measure with consolidated study focus
Step 2. Consider existing validated items
Step 3. Generate an item repository
Step 4. Select the format of measurement
Step 5. Conduct panel reviews of preliminary items

Step 6. Pretest items
Step 7. Examine tested items
Step 8. Optimise items and the questionnaire

To be noted, I adapted these steps by focussing on qualitative pretesting of the instrument rather than pursuing validity and reliability in a post-positivist paradigm (i.e., piloting the survey to a small number of physicians followed by factor analyses), as the purpose for survey development was to demonstrate the extent of unmet needs rather than to generate a scale.

6.3 Process of questionnaire development

6.3.1 Consolidate study focus with survey committee (Step 1)

The purpose of survey development was to reach Objective 3 as well as the overall aim of this study. Specifically, the questionnaire was designed to measure the extent of CSTIPs' unmet needs, so the most common needs could be addressed. As survey development requires collaborative work with context-specific discussion, I established a survey committee of six professionals from various disciplines. They were two infectious disease specialists, one public health expert, one statistician, one behavioural scientist and my supervisor having expertise in health psychology and survey design. Five were bilingual Taiwanese-English and familiar with the local contexts of CSTIPs and PrEP implementation, and one was an English native speaker experiencing in applying the COM-B/TDF model to needs assessment. To enhance theoretical coherence throughout survey development, I selected four committee members from my DrPH advisory group so that they were informed of the COM-B/TDF model. Feedback from the committee would help me gain more insights as well as acknowledge the pros and cons of survey design.

The first committee meeting was held in May 2019, the very beginning of this research project. During the meeting I debriefed the committee with the two-phase study design, the COM-B/TDF framework as theoretical foundations, sampling strategies at each phase and an expected timeframe. Establishing the survey committee at this early stage was beneficial to the study by strengthening the interconnection between formative results and survey development.

The survey was designed with four sections: demographics, understanding of PrEP, needs for PrEP service provision and recommendations on future PrEP services in Taiwan. Demographic questions had strengths in overviewing the characteristics and

representativeness of survey respondents. Understanding of PrEP included respondents' awareness of and experiences in PrEP service delivery. Needs to be measured referred to all TDF domains identified from the framework analysis in the formative phase. This approach also ensured that the processes of survey development were grounded in the COM-B/TDF model. Recommendations on PrEP services aimed to understand which settings and stakeholders CSTIPs perceived as the most appropriate to fulfil their unmet needs.

6.3.2 Generate survey items with validated instruments (Step 2 & 3)

An item consists of two components: a question stem and its corresponding response set. A list of items was generated through three steps. To begin with, I referred to existing instruments used by scholars to assess the TDF domains, such as questions originated from Michie et al. (described in Table 3.1),[37,235] the Determinants of Implementation Behaviour Questionnaire[254] developed from the original 12-domain TDF and Huijg et al.'s Dutch-English generic questionnaire validating the revised 14-domain TDF.[307] Items related to knowledge of PrEP were adapted from the 2017 European MSM Internet Survey (EMIS-2017).[308] Items for recommendation on PrEP services were informed by Cane et al.'s validation of the Behaviour Change Techniques.[309] Demographic items (e.g., type of speciality and practice) were informed by my document analyses in Phase One to reflect the context of CSTIPs. A Taiwanese study of physicians' satisfaction with the 'STI-friendly programme' was also consulted as its study population was similar to my inquiry.[310]

Subsequently, my rationale for writing questions was to follow the purpose of each section identified in the previous step. Items were revised using quotes from in-depth interviews and the results of document analyses. By adopting this approach, I ensured that items were theoretically sound with wording and terms understandable to CSTIPs. For example, key interview quotes categorised under the 'social influence' domain were employed to formulate wordings of items aiming to measure the same need. The results of document analyses inspired the design of both question stems and response set for items on PrEP programmes (e.g., National Programme, PAP and PAPA), suggested types of providers and preferred health facilities for PrEP delivery.

Finally, I followed DeVellis' guidance[305] to improve the quality of item writing. I was attentive to wording by avoiding several pitfalls, such as: lengthy descriptions; double-barrelled questions (i.e., containing two concepts in an item); ambiguous use of pronouns, adjectives and modifiers; technical jargon and leading statements. Most items were written as closed questions to standardise responses. An open-ended question was prepared to collect any

unanticipated needs for PrEP service delivery. Also, I ensured that each of the 14 TDF domains was measured by at least one item. At the end of this step, a total of 76 items were generated. I then consulted my supervisor to comment on the quality of each item with suggestions for further improvement in clarity and brevity.

6.3.3 Select the format of measurement (Step 4)

Response sets were selected based on the content of corresponding items. As this questionnaire aimed to investigate the prevalence of various unmet needs, all items were measured using nominal or ordinal categories rather than scales.

I ensured that the nominal categories in each response set were exhaustive, mutually exclusive and reflective of the context of CSTIPs by revisiting the results of documentary analysis and framework analysis. Nominal categories with multiple choices were applied to questions in the demographics section, such as the region and the type of physicians' practices. Respondents were asked to offer one response to each question in this section.

Nominal categories were also employed for recommendations on PrEP services. All stakeholders who could potentially fulfil CSTIPs' needs were listed as response alternatives, such as the TCDC, PHBs and medical specialist societies. Since a specific need could be met by more than one stakeholder, participants were encouraged to select multiple responses to these questions if applicable. To be noted, an 'Others (please specify)' option was added into the response set in this section. One key advantage of this design was to strengthen the exclusivity of nominal properties. By identifying unlisted potential stakeholders, this approach could also contribute to future research in PrEP service delivery in Taiwan.

Regarding the section on unmet needs, I decided to distinguish the knowledge domain from the other 13 TDF domains. I adopted the set of responses for PrEP knowledge from the EMIS-2017 survey,[308] which included five distinct and exclusive alternatives: 'I knew this already', 'I wasn't sure about this', 'I didn't know this already', 'I don't understand this' and 'I do not believe this'. This response set was advantageous for measuring individuals' unmet needs of PrEP knowledge in one question.[311]

Ordinal responses were used for questions about the other 13 TDF domains. To measure each construct via individual questions, I used a five-level response set: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree. According to Clason and Dormody,[312] this format would provide discrete approximations of variables of interest.

Specifically, responses to questions did not aim to form a summative Likert scale but instead captured the types of needs that participants perceived as crucial for PrEP service delivery.

Three reasons justified my choice of the five-point response set. Firstly, given each question was a needs-based statement informed by quotes from the qualitative data, the agree-disagree format could appropriately measure the needs of survey respondents. Although one can argue that a yes-no format might offer accurate measurement of the needs, a multi-levelled response set would better capture the variability of respondents in real life, particularly those holding ambivalent or neutral attitudes towards specific statements. Secondly, as the survey aims to investigate all 14 TDF-informed needs rather than to create a summative score of any specific construct, the response set would appropriately serve the purpose. Moreover, the needs were not interval variables, so using a summative score would be inappropriate. Thirdly, considering the number of options included in the response set, the five-point version could increase response rates by enhancing readability without compromising data variability. Several studies have demonstrated that a five-point response set minimises the extent of respondents' frustration and confusion in answering surveys.[313,314] Literature also suggested that, compared with the seven-point and ten-point versions, the five-point version did not affect data characteristics but offered similar utility for measurement.[315,316]

6.3.4 Expert reviews of the preliminary survey (Step 5)

After generating items with corresponding response formats, I held the second committee meeting in January 2020 to revise the preliminary questionnaire. All items and response options were originally written in Traditional Chinese, but the common language in use among committee members was English. Thus, following the guidance on forward translation,[317] I translated the survey into English and presented both languages versions to tackle the language barrier to discussion. This rationale was applied in every committee meeting, and the quality of translation was checked by a bilingual member before each meeting.

The committee first examined the relevance between the results from the formative phase and the generated items using definitions of 14 TDF domains (illustrated in Table 3.1). This was to ensure that every domain (i.e., needs for PrEP provision) was measured by at least one item in the survey. Next, all experts commented on each item for ease of comprehension, clarity and brevity, as well as on the order of items in each of the four sections. Feedback on the appropriateness and exclusiveness of response sets was also provided. Lastly, the committee provided me with suggestions on improving the layout of the

drafted questionnaire. For example, they advised on strategies for enhancing survey engagement at the beginning of the questionnaire. Information on both PrEP and the National Programme was suggested to be provided at the end of the questionnaire for ethical concerns. All suggestions were noted and considered in further revisions.

The rationale behind my survey revision process was to prioritise feedback from CSTIPs over my survey committee that comprised non-CSTIP experts. At this stage, I did not remove any item from the drafted survey but adjusted the wording and order of the items. Decisions on reducing the number of items were made in the next step as survey pretesting.

6.3.5 Pretesting and examining tested items (Step 6 & 7)

6.3.5.1 Rationale and the design of cognitive interviews

After being revised by expert reviews, the draft questionnaire was further pretested to evaluate how CSTIPs would understand and interpret the content of items as well as whether the response options were exclusive and extensive.[306] Pretesting was crucial to developing the final version of the questionnaire by improving the accuracy in measuring the needs of CSTIPs as well as ensuring that all questions could be understood by CSTIPs in a consistent fashion.

Among all types of questionnaire pretesting, I applied a cognitive interviewing approach which aligned with my qualitative inquiries throughout the thesis. Firstly introducing cognitive psychology into survey methods in 1984, the seminal book *Cognitive Aspects of Survey Methodology* defined cognitive interviewing as:[318,319(p287)]

> [T]he administration of draft survey questions while collecting additional verbal information about the survey responses, which is used to evaluate the quality of the response or to help determine whether the question is generating the information that its author intend[s].

Cognitive testing has been applied in survey design to make questions better understood and answered by respondents.[320] It aims to revise questionnaire items with respondent-oriented recommendations based on four interconnected cognitive components proposed by Tourangeau: comprehension, retrieval, judgement and response.[321] Since the purpose of cognitive interviewing was to improve the clarity of question items rather than observe cognitive activities of respondents per se, I took a *reparative* approach, which Willis described as to 'inspect-and-repair' questions,[322(p18)] by three iterative steps: identify problems in survey items, fix them based on respondents' suggestions and re-detect more problems in the next round of interview.

According to Willis, methods for data collection can be classified in two ways: think aloud and verbal probing.[320] To identify and tackle specific problems in the evaluated questions, I applied the verbal probing approach rather than think-aloud. There were three advantages of this method. First, compared with the think-aloud method, verbal probing granted the interviewer a more structured way to identify problems related to the four cognitive components while maintaining flexibility in interviewees' accounts. Second, it cast less burden on interviewees given there were more than 70 questions to be evaluated. Third, verbal probing was effective for researchers to collect data as verbal accounts as well as efficient in data analysis.

6.3.5.2 Sampling and recruitment of cognitive interview respondents

Eight cognitive interviews were conducted online from June 2020 to August 2020 (Table 6.1). The number of interviews was justified by consideration of available resources, the limited scope of the DrPH research and the capacities of CSTIPs as frontline physicians fighting against the COVID-19 pandemic. To ensure that eight interviews reflected the diversity and variety of CSTIPs, I decided to sample four participants from the 16 physicians interviewed in the formative phase as well as four from the rest of CSTIPs in Taiwan (see Table 6.1). I applied opportunity sampling by asking physicians in both groups about their willingness to take part in the interview. Those interviewed in the previous formative phase were approached through my established communications, and the latter were contacted by medical societies. During the first recruitment of study-naïve physicians, all contacted physicians refused to take part in the interviews due to time constraints in the COVID-19 pandemic. Thus, I recruited a second set of participants by contacting CSTIPs practising in southern Taiwan through direct referral from public health bureaus. To improve the rigour of study under limited recruitment, I made sure that the eight participants were from diverse contexts in terms of their specialities and geographical regions.

To improve the survey quality with a small number of interviewees, I divided all eight interviews into three consecutive rounds of revision as two, two and four, respectively. The drafted questionnaire was firstly revised based on problems identified, with suggestions provided from the first two interviews. Next, a revised questionnaire was mailed to another two participants before the interviews for a second revision. Finally, a further updated questionnaire was sent to and tested with four interviewees as the last round of revision. This strategy allowed timely improvements of the instrument without compromising the efficiency of data collection in the prolonged period of participant recruitment.

Table 6.1 Characteristics of eight participants in Phase Two cognitive interviews

Identification	Date of the interview	Type of PrEP service	Jurisdiction	Speciality
S-01 (I-03 in Phase One)	04/06/2020	S, T	Southern	Urology
S-02 (I-04 in Phase One)	04/06/2020	S	Southern	Urology
S-03 (I-09 in Phase One)	15/06/2020	Nil	Central	Family Medicine
S-04 (I-14 in Phase One)	16/06/2020	Nil	Northern	Gynaecology
S-05	13/08/2020	Nil	Southern	Family Medicine
S-06	16/08/2020	Nil	Southern	Paediatrics
S-07	23/08/2020	Nil	Southern	Dermatology
S-08	28/08/2020	Nil	Southern	Urology

PrEP: Pre-exposure prophylaxis; S: Self-paid PrEP; T: Taiwan CDC National PrEP Programme.

Note: Identification number was assigned to maintain confidentiality. The sex/gender of interviewees is not presented to maintain confidentiality.

6.3.5.3 Process of interview

Before taking part in online interviews, participants were sent three documents: an information sheet (Appendix 6), a consent form and a drafted questionnaire printed on paper. The information sheet comprised the following components: the overall aim of this study, the purpose of cognitive interview (i.e., improving the quality of a developed questionnaire), activities involved in the interview, data security and the rights of participants. The draft questionnaire was printed in Traditional Chinese, black-and-white, single sided on A4-size papers. Lasting from 30 to 60 minutes, interviews were audio-recorded with hand-written notes taken by myself as the sole interviewer. At the beginning of each interview, I explained the information sheet to the participant, ensured their confidentiality of participation and answered questions, followed by obtaining verbal and written consent signed in front of the web camera. Upon signing the consent, I asked them to turn to the first page of the paper questionnaire. Participants were encouraged to comment on the difficulties they perceived in answering each item with respect to comprehending terms and phrases, retrieving relevant information, judging the appropriateness of response

alternatives and deciding on their response. I read out each item in numeric order in Chinese and asked them for feedback; verbal probing was immediately introduced to understand how participants interpreted specific terms and to assess the level of difficulty in giving answers. Examples of verbal probes included: 'What does the term "prescribe PrEP" mean to you?', 'What parts of this question made you ponder before giving your answer?' and 'How do you think the question can be better understood?'. After finishing each section, interviewees were asked how they felt about questions in that section until all questions were tested. Finally, participants commented on their overall experience in pretesting before receiving a 500-TWD (equivalent to £12.5) gift voucher at the end of each interview.

6.3.5.4 Data analysis

The purpose of cognitive interviewing was to evaluate as well as improve the quality of items before finalising the questionnaire. To efficiently record and analyse problems in each item across all interviews, I applied a top-down approach using the Cognitive Classification Scheme.[323] The scheme comprises five major categories and 28 subcategories (Table 6.2). According to Willis, the major categories were inspired by Tourangeau's four-stage cognitive model; the subcategories were a mixture of problems related to cognitive processes as well as question features.[322(p88)] Although this scheme was originally employed by Willis and colleagues for quantitative analyses,[323,324] I adapted it as an analytical framework to thematically present the findings of cognitive interviews. The rationale for my adaptation was that the scheme was advantageous for identifying salient issues of each item with tailored recommendations for revision.[324]

The analysis was performed in four steps. Firstly, I listened to all audio-recordings twice to familiarise myself with the data while double-checking the accuracy of my interviewer notes. Next, interviewer notes were deemed as the unit of analysis. Descriptions of an interviewee's reactions to and suggestions on specific items were labelled with corresponding items. Subsequently, I coded all labelled descriptions using the 28 codes in the Cognitive Classification Scheme (Table 6.2), followed by reconfirming that my interpretation of codes was aligned with the original definitions. Finally, a list of codes with recommendations on revision (e.g., rephrasing items or adjusting response options) was generated as analysis results. Based on the findings, I adjusted the wording, content and number of survey items to ensure that all question stems and response sets were comprehensible and non-ambiguous.

Table 6.2 The Cognitive Classification Scheme applied for data analysis

Scheme	Code
Comprehension and communication	
Interviewer difficulties	1. Inaccurate instructions
	2. Complicated instructions
	3. Difficult to administer
Question content	4. Vague topic/term
	5. Complex topic
	6. Topic carried over from earlier question
	7. Undefined term(s)
Question structure	8. Transition needed
	9. Unclear respondent instruction
	10. Question too long
	11. Complex, awkward syntax
	12. Erroneous assumption
	13. Several questions
Reference period	14. Carried over from earlier question
	15. Undefined
	16. Unanchored or rolling
Memory retrieval	
	17. Shortage of cues
	18. High detail required or information unavailable
	19. Long recall period
Judgement and evaluation	20. Complex estimation
	21. Potentially sensitive or desirability bias
Response selection	
Response terminology	22. Undefined term(s)
	23. Vague term(s)
Response units	24. Response use wrong units
	25. Unclear what response options are
Response structure	26. Overlapping categories
	27. Missing categories
Other	28. Something else

Note: The scheme is originally developed by Forsyth et al. to record problems identified in cognitive interviewing. Source: Forsyth et al.[323]

6.3.6 Optimise the questionnaire product (Step 8)

After improving the quality of items and response sets, I focussed on the layout of the whole questionnaire. By improving the engagement between the questionnaire and respondents, I expected to minimise respondent drop-out and thus increase the number of valid responses.

In December 2020, I consulted with my survey committee to discuss strategies for optimising the questionnaire. Three amendments were made at this step. First, to establish engagement with respondents, I rephrased descriptions on the cover page with encouraging vocabularies that highlighted the importance of participation. Second, to retain the extent of engagement with CSTIPs, I moved items directly related to PrEP to the beginning of the questionnaire. After adjustment, the questionnaire starts with the 'understanding of PrEP' section and closes with demographic questions. Third, given that items were pretested on paper rather than in a web-based form, the committee provided feedback tailored to online surveys. Issues such as logic flow, presentations on computer screen/mobile devices and readability of items/response sets were improved. For example, the agree-disagree response set for measuring needs would be displayed not in a matrix but as separate multiple-choice questions. Such adjustment would improve mobile users' experience in filling out the survey. A finalised online survey in Traditional Chinese is presented in Appendix 7.

6.4 Plans for survey administration

Although my study objectives do not include survey distribution, a rigorous survey development involves practical considerations for survey administration. To maximise the feasibility of questionnaire administration, I made four decisions after discussion with my survey committee. First, the survey would be self-administered by respondents with full anonymity. As responses were neither identifiable nor observable, the anonymous and self-administered survey can minimise the social desirability bias, which means that physicians may avoid selecting options perceived as socially unfavourable (e.g., expressing disagreement to seeing patients in need of sexual health services).

Second, the survey was designed in a web-based form using the SurveyMonkey programme (SurveyMonkey Inc.; San Mateo, California, USA). Compared to paper-based designs, web-based surveys pose fewer financial and time constraints on researchers.[325,326] Responses to online surveys are auto-saved in specific datasets from which data are easily retrieved for further analyses. Also, online surveys have been widely accepted in Taiwan – in 2019, 86 per cent of residents had access to internet services.[327] The rate of internet access could be presumably higher among physicians.

Third, considering sampling strategies, I chose a total population sample given that the number of CSTIPs was manageable at 706 in December 2020 and that all CSTIPs' postal addresses were listed in the public domain. While such a sampling strategy could maximise data representativeness and minimise sampling error, it did not guarantee a high response rate to the questionnaire as mailed paper surveys are generally subjected to low responses.[306] This led to further concerns about recruiting respondents.

Lastly, to reach as many respondents as possible, I applied a multi-modal approach for survey distribution. The online survey could be distributed to CSTIPs by e-mailing a designated web-link, but lists of e-mail address were incomplete and not publicly available. To reach physicians who infrequently used e-mail communications or who did not provide such information, I applied a web-pushed method, defined as using postal communications to obtain responses to web-based questionnaires rather than paper-based surveys.[328] This approach was adopted using a two-dimensional quick response (QR) code which designated the online survey. By scanning the code with the camera on a mobile device, participants will be directed to the introductory web page of the survey. Also, the QR code can be printed on paper invitation letters, so participants can be effectively linked from postal mails to the online survey with minimal effort. The feasibility of QR codes for recruiting online survey participants has been supported by health studies in Taiwan.[329,330] Considering budget availability and research efficiency, I set the data collection period as 12 weeks with two postal reminders sent to all STIPs in the third and sixth week. In summary, the questionnaire was designed as a web-based, self-completed, anonymous instrument assisted by both e-mail and web-pushed methods to recruit all CSTIPs in Taiwan.

Chapter 7 Phase Two Results: A Theory-informed Questionnaire

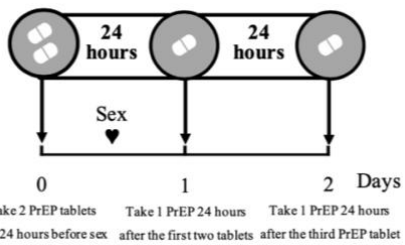
This chapter reports on revisions made to my theory-informed questionnaire that measures the unmet needs of CSTIPs for delivering PrEP services to MSM. As described in Chapter 6, the questionnaire was designed with four sections: understanding of PrEP; needs for PrEP service provision; recommendations on future PrEP services in Taiwan; and respondent descriptors. The chapter considers each section in this order. Each section starts with the initial survey items generated from the findings in Phase One, followed by problems identified by cognitive interviewees and my survey committee. Next, using themes from the Cognitive Classification Scheme (Table 6.2), I modify the wording and syntax of items to reduce potential measurement errors. Finally, I present three key improvements to the questionnaire by considering its layout, eligibility questions and web optimisation. The chapter ends with a 70-item self-administered online survey in Traditional Chinese (Appendix 7) to meet Objective 3 of the study.

7.1 Section One: Understanding of PrEP

7.1.1 Initial items

Seven items were initially generated to measure CSTIPs' understanding of PrEP. Table 7.1 presents a list of items with corresponding response options and sources of origin. Item 1 and Item 2 offered basic understandings of respondents' awareness and perceived capabilities of PrEP prescribing. Item 3 and Item 4 investigated respondents' experience in PrEP prescribing, a potential determinant of physicians' PrEP prescribing needs. The last three items (Item 5A, 5B and 5C) measured respondents' level of knowledge of PrEP, originating from the EMIS-2017 survey designed for MSM. They contained factual statements on general and specific knowledge of PrEP: a general principle of PrEP (Item 5A), information on the daily PrEP (Item 5B) and information on the event-driven PrEP for MSM (Item 5C). These three items were presented as facts. Response options took account of variation in comprehension ('I don't understand this') and belief ('I do not believe this').

Table 7.1 Initial questionnaire items in Section One

Item No.	**Question stem**	**Response option** (Rationale: Multiple choice question with one answer, unless specified)	**Source**
1	Have you heard of PrEP?	• Yes • No • I am not sure	The Knowledge domain in Michie et al. (2005)
2	Do you know how to prescribe PrEP?	• Yes • No • I am not sure	The Skill domain in Michie et al. (2005)
3	Have you ever prescribed PrEP to patients/users?	• Yes • No	Researcher
4	Following the question above, what model(s) have you prescribed PrEP within?	(TICK ALL THAT APPLY) • Never prescribed PrEP • Taiwan CDC PrEP programme • Patient Assistance Programme (PAP) • Self-paid PrEP	Researcher (Based on document analysis)
Q5	The following statements are all TRUE. Did you know this already?	Not applicable (as instructions to items)	EMIS-2017
5A	Pre-exposure prophylaxis (PrEP) involves someone who does not have HIV taking pills before as well as after sex to prevent them getting HIV.	• I knew this already • I wasn't sure about this • I didn't know this already • I don't understand this • I do not believe this	EMIS-2017
5B	PrEP can be taken as a single daily pill if someone does not know in advance when they will have sex.	The same as Item 5A	EMIS-2017
5C	If someone knows in advance when they will have sex, PrEP needs to be taken as a double dose approximately 24 hours before sex and then at both 24 and 48 hours after the double dose.  	The same as Item 5A	EMIS-2017 Figure is reproduced from the 2018 Taiwan national PrEP guideline[12]

TDF: Theoretical Domains Framework; EMIS-2017: European Men-Who-Have-Sex-With-Men Internet Survey 2017.[308]

7.1.2 Problems identified and revisions

Problems related to comprehension, judgement and response selection were revealed through the cognitive interviews. Regarding issues of comprehension, clearer definitions of technical terms were required to avoid confusion. For example, interviewees commented that PrEP should be fully spelt out as 'Pre-Exposure Prophylaxis' when appearing for the first time in the questionnaire. The committee suggested that I distinguish PrEP from PEP (post-exposure prophylaxis) by underlining or bolding the prefix 'Pre' [前 *qián* in Traditional Chinese] to avoid misunderstanding.

Another comprehension problem emerged from the three-item question about PrEP knowledge (i.e., Item 5A, 5B and 5C, see Table 7.1). As this question aimed to assess physicians' knowledge of PrEP, the survey committee pointed out the wording referring to PrEP users was inconsistent with the terminology in Taiwan's national PrEP guideline. For instance, the term 'someone' in the question was considered too general for respondents to understand the statement. The committee suggested using both female and male pronouns [她/他 *tā / tā* in Traditional Chinese] in the statement of daily PrEP (Item 5B). Regarding the statement of event-driven PrEP (Item 5C), the committee suggested substituting 'someone' with 'men-who-have-sex-with men', given that event-driven PrEP was recommended for MSM in Taiwan instead of all populations.

Some respondents felt that the introductory sentence of Question 5 could lead to a judgemental bias. Interviewees commented that the introduction did not emphasise a reference period for their answers (i.e., their past or current knowledge levels), which they considered crucial for making judgements. They also worried that this lack of clarity would trigger social desirability bias. Specifically, respondents might answer 'I knew this thing already' to reach social expectations despite lacking knowledge of PrEP. To tackle this issue, I revised the introductory sentence as 'Before completing this questionnaire, to what extent did you know these statements to be true?'. By emphasising respondents' knowledge level before survey administration, the revision aimed to increase clarity and minimise social desirability bias.

Problems of response options stemmed from the vagueness of wording. When evaluating response options for Item 4, interviewees suggested unpacking 'self-paid PrEP' into 'self-paid PrEP (patented)' and 'self-paid PrEP (generic)', so physicians' experiences in PrEP prescribing could be fully captured. Another example was the use of 'this' in all response options for Question 5. While the use of 'this' might demonstrate conciseness in English, the

survey committee pointed out that the term 'this' [這個 *zhè ge* in Traditional Chinese] could confuse respondents due to its vagueness. Thus, I modified 'this' with 'this thing' or 'this statement' to improve the clarity of responses and cohesion between question instructions and items. Taking lexical collocations in Taiwan into consideration, I applied 'this thing' [這件事 *zhè jiàn shì* in Traditional Chinese] to the former three options (i.e., knew/not sure/didn't know) while employing 'this statement' [這個敘述 *zhè ge xù shù* in Traditional Chinese] to the latter two options (i.e., don't understand/don't believe). I then evaluated the revised Question 5 in cognitive interviewing, where all participants did not report any difficulty in understanding item wording and response options.

The number of items in Section One was unchanged after the evaluation. All items were presented in the final version of the questionnaire (Appendix 7).

7.2 Section Two: Needs for PrEP service provision

7.2.1 Initial items

Informed by the COM-B/TDF framework and the findings of Phase One, I initially drafted 49 items to measure CSTIPs' needs for delivering PrEP services. Of all items, more than two-thirds (35 of 49) were inspired by the accounts of interviewees in Phase One, whereas 14 were created by my consultation with documentary analysis and two members of my survey committee. Except for the knowledge domain (which was measured in Section One), each of the rest 13 TDF domains was measured by at least two items. The number of items per domain ranged from two to eight, depending on the diversity of needs identified in Phase One. The response set for all items was a five-point scale: Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree and Strongly Agree. Table 7.2 contains the wording, relevant domains and references of the 49 items in the initial version of Section Two.

Table 7.2 Initial questionnaire items in Section Two

Item No.	Question stem	Source	TDF domain (Number of item)
6	I have clinical skills to provide PrEP services.	R	Skills (2)
7	I have the ability to persuade colleagues in my clinic to take samples for HIV testing, because it is a prerequisite for PrEP services.	I	
8	If I am to provide PrEP, I need a standard operating procedure tailored to physicians working at clinics.	I	Behavioural regulation (2)
9	If I am to provide PrEP, I need other healthcare professionals (e.g., nurses) to follow up clients' adherence to medicine.	R	
10	I forget how to provide a service if I do not practise it every day.	I	Memory, attention and decision processes (2)
11	PrEP requires more attention than other sexual health services.	R	
12	The cost of drug stocking and procurement management for PrEP will challenge the operations of my clinic.	I	Environmental context and resources (4)
13	There is little market for PrEP service in Taiwan.	I	
14	The department of health in my county/city helps me to provide sexual health services to clients.	I	
15	Most clients cannot afford PrEP if paying out-of-pocket.	I	
16	Knowing that other physicians are providing PrEP services is important to me.	R	Social influences (5)
17	I will provide PrEP services only if clients actively ask for PrEP.	I	
18	There is not enough trust between me and my patients for me to provide PrEP.	I	
19	Clients are hostile to physicians who provide sexual health services.	I	
20	Many physicians like me these days are willing to take a sexual history from patients.	I	
21	Providing MSM with PrEP for HIV prevention is a practice that is consistent with my profession.	R	Social/professional role and identity (5)
22	I think I am an expert when it comes to PrEP.	I	
23	My job Is to promote moral ways of living, including sexual lives.	I	
24	I will ensure my clients know all the methods of HIV prevention.	I	
25	Providing government-funded public health projects like PrEP is central to being a CSTIP.	R	
26	I am confident that, if I wanted, I could provide PrEP services to MSM.	R	Beliefs about capabilities (4)
27	I believe that I can provide PrEP services to my clients if I want to.	R	
28	I currently have time to provide more services in my daily practice.	I	

29	I feel confident in managing clients who require regular follow-ups.	I	
30	With PrEP services, I'm optimistic about ending AIDS by 2030 in Taiwan.	I	Optimism (3)
31	People who have risky sex don't care enough about their health to take PrEP.	I	
32	The number of new HIV infections will be reduced if more people take PrEP.	I	
33	PrEP will benefit public health in Taiwan.	I	Beliefs about consequences (8)
34	Providing PrEP will make me become an HIV expert.	I	
35	If I am considered as an HIV specialist by the public, the number of patients in my clinic will decrease.	I	
36	PrEP services will improve my relationship with MSM clients.	R	
37	PrEP will increase users' number of sexual partners.	I	
38	PrEP will increase the transmission of STIs.	I	
39	PrEP will increase users' frequency of sexual intercourse and condomless sex.	I	
40	PrEP service will result in medical claims and much paperwork.	I	
41	Monthly paperwork derived from PrEP services makes me annoyed.	I	Emotion (3)
42	I feel sad when diagnosing patients with HIV.	I	
43	Discussing PrEP for HIV prevention with patients makes me uncomfortable.	I	
44	I have asked others how to provide PrEP services.	I	Intentions (3)
45	I intend to provide PrEP services in Taiwan in the future.	R	
46	I want to improve the sexual health of gay men.	R	
47	I have a clear plan of when I will provide PrEP services to MSM this year.	R	Goals (4)
48	I would like to increase my profits by providing PrEP services.	I	
49	My goal is to promote condom use with every act of sex.	I	
50	I want to see the end of AIDS in Taiwan.	R	
51	I get adequate financial reimbursement if I deliver PrEP services following the Taiwan PrEP guideline.	I	Reinforcement (4)
52	The profitability of PrEP is primary in my decision to deliver it.	R	
53	I will feel psychologically rewarded if I provide PrEP services.	I	
54	Delivering PrEP services will increase the number of clients at my clinic.	I	

*Section instruction: 'To what extent do you agree with the following statements about PrEP services?'

I: Interviewees; R: Researcher; PrEP: Pre-exposure prophylaxis; MSM: Men-who-have-sex-with-men; STI: Sexually transmitted infection; CSTIP: Community-based sexually-transmitted-infection-friendly physicians; TDF: Theoretical domains framework

Response options for all items: Strongly Disagree, Disagree, Neither Disagree nor Agree, Agree and Strongly Agree.

7.2.2 Problems identified and revisions

Problems related to comprehension and memory retrieval were recognised from item evaluation. No interviewee raised concerns over the appropriateness of the response options. Also, as the questionnaire was designed for self-completion, problems related to communications between interviewers and respondents were not identified. The following paragraphs illustrate each type of problem encountered by interviewees and the modifications made in response.

7.2.2.1 Comprehension

Item evaluation uncovered three challenges to comprehension: question content, question structure and reference period. The following sections presented examples of these challenges and corresponding revisions.

7.2.2.1.1 Question content

Problems of question content focussed on three aspects. Firstly, concrete definitions of topics, particularly abstract concepts, were lacking. This lack of clarity could cause potential confusion among respondents as well as compromise the surface validity of measurements. For instance, the undefined ‘clinical skills’ in Item 6 (I have clinical skills to provide PrEP services) were considered unclear and prone to subjective interpretation. The survey committee advised modifying the item by attaching concrete descriptions of skills for PrEP services, such as conducting HIV testing, assessing users’ risk of HIV infection and explaining indications of PrEP. Similar concerns about unspecific terms were raised during cognitive interviews, such as ‘little market’ in Item 13, ‘important’ in Item 16, ‘more services’ in Item 28 and ‘uncomfortable’ in Item 43. Interviewees felt that these concepts were too abstract for respondents to understand items in a consistent way. They suggested that specific definitions should be offered to improve item clarity, such as defining ‘little market’ as few users needing PrEP, rephrasing ‘important’ by using a concrete example and explicitly using ‘PrEP services’ than ‘more services’. The general adjective ‘uncomfortable’ in Item 43 was also replaced and rephrased in the first person as ‘Discussing PrEP for HIV prevention with patients makes me feel embarrassed.’

In addition to lacking definitions, some items contained terms that were perceived as too extreme to demonstrate potential variety in responses. For example, regarding Item 22 (I think I am an expert when it comes to PrEP), one interviewee alerted that most CSTIPs would not consider themselves as PrEP experts, given few had prescribed PrEP in practice. Hence, respondents were more likely to answer the item with ‘Strongly disagree’ or

‘Disagree’, which led to a low extent of item discrimination. Another instance was the use of adverbs of frequency. Considering the content of Item 10 (I forget how to provide a service if I do not practise it every day), participants argued that prescribing PrEP on a daily basis was hardly possible. They suggested replacing the adverb ‘every day’ with ‘often’ to reflect clinical scenarios properly as well as prompt diversity in responses.

Secondly, some items referred to similar concepts without distinction between each other. Such similarity could hinder respondents from understanding the meaning of items. For example, both Item 26 and Item 27 were designed to measure CSTIPs’ belief about capabilities for serving various populations, but their wording did not precisely reflect the difference. In cognitive interviewing, participants expressed difficulties in understanding both items on the grounds that the term ‘MSM’ in Item 26 and ‘my clients’ in Item 27 were not mutually exclusive. To emphasise the distinction between MSM and other populations, I decided to replace ‘my clients’ with ‘patients who are not MSM’ in Item 27 as well as apply a parallel sentence structure to both items.

Thirdly, illogical use of synonyms was highlighted throughout my survey pretesting. Some interviewees requested clarifications of the inconsistent use of patients, users and clients across various items referring to PrEP users. When asked about what terms would enhance CSTIPs’ understanding of questions, interviewees suggested using either ‘patients’ (aligned with the terminology in Taiwan’s Medical Care Act[104]) or ‘users’ rather than clients, as the latter implied business acts. Similarly, others identified that the use of both MSM (Item 26, 36 and 47) and gay men (Item 46) in the section were confusing, given the former implied sexual behaviour and the latter denoted sexual orientation. To avoid misunderstanding and align with the standard terminology by the TCDC, I adopted suggestions from the survey committee by spelling out MSM as ‘men-who-have-sex-with-men’ [男男性行為 *nán nán xìng xíng wéi* in Traditional Chinese] in all corresponding items in the questionnaire.

7.2.2.1.2 Question structure

Three issues of question structure emerged throughout item evaluation. The first problem referred to the use of complex or irrelevant syntax. Regarding complex syntax, interviewees found that items using negative sentences challenged their comprehension. For example, physicians expressed difficulties in understanding Item 31 (People who have risky sex don’t care enough about their health to take PrEP) due to the single negation. The item was rephrased using an affirmative sentence together with an attitude-oriented syntax (i.e., ‘I think’) to enhance readers’ comprehension. Similarly, physicians commented that the phrase

‘not enough trust between me and my patients’ in Item 18 was difficult to answer, followed by suggestions on a simplified and affirmative sentence using the phrase ‘the lack of trust in patient-physician relationships’. After revision, no further problem in either item was identified.

In addition, irrelevant use of syntax was identified as problematic. Given the section applied an attitudinal ‘Disagree-Agree’ response set for needs assessment, comprehension mismatches occurred in items describing physicians’ behaviour rather than attitude or belief. For instance, cognitive interviewees commented that the notion of Item 44 (I have asked others how to provide PrEP services) was past behaviour rather than their attitudes. Agreeing with this suggestion, I revised the item as ‘I want to know how other physicians provide PrEP services’ to ensure that the relevance between response categories and items.

The second problem arose from inappropriate assumptions of CSTIPs’ needs. While the questions were predominantly informed by physicians’ accounts in Phase One, cognitive interviewees considered some items as leading questions with unsubstantiated assumptions. Such concerns were raised in evaluating the following items: Item 19 presumed that conflicts generally existed in CSTIPs’ relationships with patients. Item 23 assumed specific morality in sexual activities, upon which several interviewees disagreed. Item 37, 38 and 39 respectively attributed multiple sexual partners, STI transmission and condomless sex to PrEP, but none of them had been proven as the consequences of PrEP. Item 40 implied that PrEP service provision resulted in medical claims, with which prescribers disagreed during the evaluation. To minimise unnecessary confusion as well as negative stereotypes of PrEP among respondents, I adjusted the sentence structure (e.g., using ‘I think’ to improve hedging) and removed items that applied unproven assumptions. All items removed from the initial questionnaire were summarised in Section 7.5.

The third problem was the use of double-barrelled questions, known as a single item involving two inquiry topics. For instance, Item 13 (‘Providing government-funded public health projects like PrEP is central to being a CSTIP’) asked respondents about their attitudes to both government-funded projects and CSTIPs’ responsibility of PrEP delivery at the same time. As this item aimed to measure CSTIPs’ professional identity as a prescribing need, I decided to focus solely on PrEP services rather than delivery models. Revised as ‘Providing PrEP services is one of the responsibilities of CSTIPs’, the item did not encounter further problems during evaluation.

7.2.2.1.3 Reference period

The last type of challenge to comprehension occurred in items with undefined reference periods. Two items in the section faced this problem: Item 45 adopted the term 'in the future' to measure respondents' intentions, while Item 47 applied 'this year' to measure respondents' goals of PrEP service delivery. Given both adverbs of time were perceived as unspecific, the survey committee suggested using concrete reference periods (e.g., next six or 12 months) to minimise potential ambiguity. After consulting the committee, I changed both items with 'in the next six months', which provided respondents with a concrete and reasonable time frame. In addition, cognitive interviewees identified similar content in items measuring intentions or goals. I reordered relevant items (i.e., Item 44-49) with careful considerations to enhance the flow of the questionnaire.

7.2.2.2 Memory retrieval

A flaw of memory recall was uncovered when respondents expressed lacking information for making their answers. When evaluating Item 15 ('Most clients cannot afford PrEP if paying out-of-pocket'), some participants found it difficult to answer as they did not remember how much PrEP cost their patients. They suggested the item should include a reference price of PrEP in Taiwanese Dollar so that physicians could give an accurate answer based on the socio-economic status of their patients. Nevertheless, my survey committee disagreed with the suggestion from interviewees, given that the cost of PrEP to users depended on the type of modalities (e.g., daily versus event-driven) and programmes (e.g., the PAP or PAPA programme). Displaying an arbitrary monetary value might not establish valid answers but bias CSTIPs' responses with an unsubstantiated reference point. After considering both perspectives, I kept the item unchanged because using attitudinal questions for needs measurement would always involve respondents' subjectivity. Had the item offered a specific price of PrEP, CSTIPs would have answered it by estimating whether their patients could afford the price, which inevitably involved subjective judgements.

7.2.2.3 Judgment

A few physicians considered items measuring the emotion domain to be sensitive questions. For example, an interviewee contended that the term 'annoyed' in Item 41 might make respondents reluctant to answer this question because negative emotions like annoyance contradicted social expectations of physicians. Acknowledging this concern, I discussed with my survey committee and decided to remain the original wording with two justifications. First, the item earned its place as themes of negative emotions recurrently emerged from my data in Phase One. Second, applying a personal tone to measuring emotion could improve

respondents' engagement with the questionnaire. I felt these advantages outweighed the disadvantages resulting from the social desirability bias. No other issues of judgement were reported in further examinations.

7.3 Section Three: Recommendations on future PrEP services in Taiwan

7.3.1 Initial items

To establish context-specific recommendations on PrEP scale-up in Taiwan, I drafted 16 items in the first version of the questionnaire (Table 7.3). Of all items, two respectively focussed on recommended venues and providers for PrEP service delivery, and the remaining 14 items identified potential stakeholders who could fulfil CSTIPs' service provision needs. Inspired by the TDF, the 14 items represented each TDF domain and shared the same response category (i.e., I do not need help, Taiwan CDC, local public health bureau, medical specialist societies and an open-text option as 'Others').

Table 7.3 Initial questionnaire items in Section Three

Item No.	**Question stem**	**Response option** (Rationale: Multiple choice question allowing for multiple responses, unless specified)	**Source (concept)**
55	Where do you think is the optimal setting for PrEP service delivery in Taiwan? (Choose the best option)	• Hospital is the optimal setting for PrEP service • Clinic is the optimal setting for PrEP service • Both hospital and clinic are optimal for PrEP service • I do not think PrEP should be provided	R (Based on documentary analyses)
56	In Taiwan, do you think PrEP should be provided by…	• Infectious disease specialist • Non-infectious disease specialist • Any physician who finished PrEP education training • Any physician regardless of PrEP education training • I do not think PrEP should be provided by doctors	R ('Purview paradox' by Krakower et al.[151])
Intro	If you are asked to provide PrEP services in the future, who do you think should help you with the following needs?	*From Item 57 to Item 70:* • I do not need help • Taiwan CDC • Local public health bureau • Medical specialist societies • Others (please specify):	R (Based on documentary analyses)

Item No.	Question stem	Source (concept)
57	Improve my knowledge about PrEP	I (Knowledge)
58	Increase my skills at providing PrEP	R (Skills)
59	Remember how to provide PrEP	R (Memory, attention and decision Processes)
60	Have easy-to-follow guidance on PrEP service delivery	I (Behavioural regulation)
61	Reduce the cost of PrEP to the amount that my clients can afford	I (Environmental context and resources)
62	Promote more potential users to ask for PrEP at my clinic	I (Social influences)
63	Strengthen my professional identity as a PrEP provider	R (Social/professional role and identity)
64	Boost my confidence to provide PrEP service	I (Beliefs about capabilities)
65	Be optimistic about PrEP in Taiwan	R (Optimism)
66	Reduce negative emotions in PrEP service provision	R (Emotion)
67	Simplify the process of and paperwork for PrEP service	I (Beliefs about consequences)
68	Ensure my clients know all the methods of HIV prevention	R (Intentions)
69	Set goals for PrEP services in my practice	R (Goals)
70	Get reimbursement and financial support	I (Reinforcement)

I: Interviewee; R: Researcher; PrEP: Pre-exposure prophylaxis. Concepts for Item 57-70 was informed by the Theoretical Domains Framework.[36]

7.3.2 Problems identified and revisions

In this section, interviewees reported difficulties in understanding the content, making judgements and selecting options. Firstly, considering comprehension, interviewees identified an unproven assumption in Item 66 (Reduce negative emotions in PrEP service provision). Specifically, 'negative emotions' was considered ambiguous; the assumption that PrEP prescribing correlated with negative emotions might be nonsensical to CSTIPs, given that the majority had no experience in PrEP delivery. They also doubted if physicians' emotional needs could be fulfilled by the institutions provided in the response options.

Secondly, some interviewees identified sensitive terms that could bias respondents' judgements. They argued that the adjective of 'optimal' in Item 55 implied the best suggestion and that the modal verb 'should' in Item 56 indicated the responsibilities of stakeholders in assisting respondents. To minimise potential biases and make items less sensitive to respondents, I revised the items by using a more semantically neutral syntax as 'Which/who do you think are appropriate…'. The revised items were acceptable to the remaining interviewees and my survey committee.

Another judgement concern highlighted the complex nature of the needs. Taking Item 61 (Reduce the cost of PrEP to the amount that my clients can afford) as an example, interviewees addressed the multiple dimensions of cost reduction, including: price negotiation between governments and pharmaceutical companies, agreement on price setting between governmental sectors (e.g., funded by the TCDC or under Taiwan's National Health Insurance) and operational costs to PrEP prescribers. Acknowledging that each need required efforts from multiple stakeholders, I kept this item unchanged as measuring subtleties in intervention design were not the aim of my thesis.

Lastly, response options for the questions were reported as lacking inclusivity. For Item 55 designed to investigate adequate settings for PrEP provision, interviewees suggested applying multiple responses to the items to capture more diversity in responses. Acknowledging other service delivery models worldwide, the survey committee advised me to add 'pharmacy (with prescription)' and 'pharmacy (without prescription)' into the response set to demonstrate the potential of multi-modal PrEP services in Taiwan. Regarding items identifying key stakeholders (From Item 57 to Item 70), the survey committee suggested adding 'local sexual health organisation' [性健康相關民間團體 *xìng jiàn kāng xiāng guān mín jiān tuán tǐ* in Traditional Chinese] to the response options, so all key stakeholders could be recognised in the questionnaire.

7.4 Section Four: Demographics

7.4.1 Initial items

The last section of my questionnaire comprised five demographic items (Item 71-75) and one open-ended question (Item 76) to collect overall feedback from respondents. As shown in Table 7.4, the initial demographic variables included the status of certification, type of practice, geographical region of practice, type of speciality and respondents' sex/gender. Except for the sex/gender variable in Item 75, all demographic variables were designed based on the TCDC's public database on all CSTIPs, so the representativeness of survey respondents, as well as the effects of non-response bias, could be examined. Informed by the documentary analysis in Phase One, I drafted all items using common classifications by corresponding governmental departments. Specialities in the response options for Item 74 were medical societies that had/were certifying 'STI-friendly physicians' in Taiwan.

Table 7.4 Initial questionnaire items in Section Four

Item No.	**Question stem**	**Response option** (Rationale: Multiple choice question with single response, unless specified)
71	Have you been certificated as a sexually-transmitted-infection-friendly physician by Taiwan CDC or any medical association?	• Yes • No
72	What type of healthcare facilities are you practising in? (Choose ALL THAT APPLY)	• Clinic • Public health centre • District hospital • Regional hospital • Medical centre • None of the above
73	In which region are you currently practising?	• Northern Taiwan • Central Taiwan • Southern Taiwan • Eastern Taiwan
74	In which of the following specialities are you licensed? (Choose ALL THAT APPLY)	• Urology • Family medicine • Obstetrics and gynaecology • Dermatology • Colorectal surgery • Infectious disease (ID) • Internal medicine, non-ID • Other surgical specialities • Not a specialist

75	Are you…?	• Man • Woman
76	Is there anything you would like to add about HIV, PrEP or this study?	Open-ended text box

7.4.2 Problems identified and considerations of revision

Flaws in comprehension and response were discovered by pretesting. While respondents did not highlight difficulties in understanding the wording and content of all items, the survey committee expressed two concerns when respondents answered Item 72 and Item 74 with multiple responses. First, choosing multiple specialities in one question might complicate the process of data analysis as well as making either descriptive or inferential statistics; and second, multiple responses to demographics were invalid because each physician in Taiwan could only register at one medical practice using one speciality license. Hence, the committee suggested rephrasing both Item 72 and Item 74 with the type of practice and speciality that physicians used for their medical practice registration [執業登記 *zhí yè dēng jì* in Traditional Chinese]. I revised both items with the syntax 'currently registered for practice' to improve clarity as well as to ensure the validity of responses.

Problems of response selection were related to the exhaustiveness and the order of options in three items. To ensure all geographical regions in Taiwan were presented, interviewees suggested adding 'outer island' to the response options for Item 73. When evaluating Item 74, physicians addressed the importance of identity by listing more specialities in which CSTIPs practised, such as occupational medicine, paediatrics and psychiatry. Moreover, one interviewee advised that the response options should be listed alphabetically to reduce respondents' cognitive burdens and the response order effect. Lastly, during the pretesting of Item 75, two interviewees proposed a third sex/gender category to raise gender diversity awareness among CSTIPs. Recognising the gender recognition movement and diversity beyond the traditional sex/gender binary (i.e., man/woman), I decided to add 'non-binary' [非二元性別 *fēi èr yuan xìng bié* in Traditional Chinese] to the response categories for Item 75.

When examining the questionnaire flow, my survey committee pointed out that Item 71 was designed to confirm respondents' eligibility and suggested moving it to the beginning of the survey. To ensure all responses will be from eligible physicians, I moved this item from Section Four to the introductory page as an additional screening question (described in Section 7.6.1).

7.5 Removed items

After pretesting and iterative discussion with my survey committee, I removed six items from the initial questionnaire (see Table 7.5). Items were dropped because of erroneous assumptions (Item 19, 36 and 66), lack of differentiation in responses (Item 22) and overlap with other items in the same domain (Item 48). In addition, functioning as a screening question, Item 71 was relocated to the introductory page. I maintained the relevance between items and CSTIPs' needs for PrEP service delivery by ensuring each TDF domain was measured by at least two items.

Table 7.5 A list of items removed during questionnaire development

Item No.	**Content**	**Reason for removal**
19	Clients are hostile to physicians who provide sexual health services.	An unsubstantiated and sensitive assumption of patient-physician relationships
22	I think I am an expert when it comes to PrEP.	Lack of variation in responses as most CSTIPs had never prescribed PrEP and would not call themselves experts.
36	PrEP services will improve my relationship with MSM clients.	Unsubstantiated assumption of poor patient-physician relationships
48	I would like to increase my profits by providing PrEP services.	Irrelevance with the Goal domain; Redundancy as the wording is very similar to Item 52
66	Reduce negative emotion in PrEP service provision	An unsubstantiated assumption of providers' emotion in service delivery
71	Have you been certificated as a sexually-transmitted-infection-friendly physician by Taiwan CDC or any medical association?	A screening question rather than an item of inquiry

7.6 Other revisions to the questionnaire

7.6.1 Screening questions

To ensure that all respondents to this web-based questionnaire were CSTIPs (defined in Section 4.2), I designed two questions for confirming if respondents had been certified as STI-friendly physicians and if they worked in either a clinic or a public health centre. Respondents must answer the two screening questions and give their consent before entering the first item of the questionnaire. Those who answered 'No' to either of the screening questions will be redirected to an exit page with information about their ineligibility to the questionnaire.

7.6.2 Flow of the question

I made some revisions to enhance the question flow. Firstly, Items were grouped into four sections with clear instructions. I started the survey with PrEP knowledge and experience items, which were very relevant to the study topic and with low complexity. Secondly, I applied a filter question to ensure that items were meaningful to respondents. For example, those who answered 'No' to Item 3 (Have you ever prescribed PrEP to patients/users?) should skip Item 4 (What models have you prescribed PrEP within?) because they had no experience in PrEP prescribing. Lastly, to enhance the flow of questions measuring each TDF domain, I adjusted the order of items in Section Two based on feedback from interviewees and the survey committee. The revised order helped the survey maintain a narrative flow.

7.6.3 Optimisation: from paper-based to web-based survey

The questionnaire was pretested on paper but is intended for online administration. I therefore transformed the questionnaire from paper to the web by adopting three ways of optimisation.

First, expecting most respondents to use a mobile phone to access the online survey, I kept questions, response sets and the figure of Item 5C clearly presented on mobiles with various operating systems, including the Android and the iOS system. Due to the limited screen size of mobiles, I revised Section Two by breaking the 'disagree-agree' response matrix into individual questions to enhance readability.

Second, together with two members of my survey committee, I conducted iterative testing to identify and fix challenges in self-completion, so respondents' experience in survey participation would be enhanced. I ensured that, once respondents gave their answers, the

survey automatically scrolled down to the next question without unnecessary interruptions. The number of clicks required to proceed was minimised.

Third, I tested the questionnaire on personal computers by examining the layout, clarity and flow of items. Time for completing the optimised survey on both computers and mobiles was reported by physicians as within 15 minutes.

7.7 The final version of the questionnaire

A 70-item, web-based, self-administered questionnaire in Traditional Chinese was finalised to meet Objective 3 of this study. Of all items, 15 remained unchanged throughout the survey development. Appendix 7 demonstrates the final questionnaire in Traditional Chinese, and Appendix 8 presents a translated version in English.

7.8 Chapter summary

This chapter described the step-by-step process of survey development from item generation, qualitative pretesting, decision-making on item revision and web optimisation of the final survey. Adapting the Cognitive Classification Scheme with narratives to reporting the findings of cognitive interviews, I identified various problems for comprehension, memory recall, judgement and response selection across all survey sections. Compared with the first version, the revised questionnaire provided respondents with a clearer understanding of the question stems, a simpler task for recall and estimation and more inclusive response sets. Items on all 14 TDF domains were designed to measure CSTIPs' needs for delivering PrEP services. Except for Emotion, all domains were covered by items designed to identify stakeholders who could satisfy CSTIPs' needs. Challenges, limitations and implications of questionnaire development are revisited in the next chapter.

Chapter 8 Discussion and Conclusions

In this chapter I revisit and discuss the key findings from the thesis. This final chapter ends with key implications for Taiwan's PrEP implementation and future research in PrEP service delivery.

8.1 Overall key findings of the thesis

This research project aims to understand the limited engagement of CSTIPs with the Taiwan CDC National PrEP Programme. I did this by identifying physicians' needs and developing a novel questionnaire for measuring these needs. In line with the recommendations from my DrPH Review Panel, I complete this thesis by finalising the questionnaire and leaving its administration for future work.

Applying in-depth interviews and document research, Phase One of the study mapped the CSTIPs' needs for PrEP prescribing onto all 14 domains and three behaviour components in the COM-B/TDF model. The sampled CSTIPs expressed a wide range of needs regarding their limited capabilities, missed opportunities and low motivation to join the National Programme. The findings suggest that, compared with prescribers, non-prescribers lack capabilities and opportunities for PrEP service delivery. Regarding motivation, both prescribers and non-prescribers reported lacking a diversity of motivation for joining the National Programme, including: lack of professional confidence; personal biases and moral judgement towards MSM; disbelief in positive health outcome of PrEP; low incentives compared with private PrEP models; anticipated administrative burden and distrust in governmental programmes. This phase also uncovered multi-faceted PrEP stigma at individual and societal levels, which prevent CSTIPs from seeking to satisfy their service provision needs for delivering PrEP to MSM.

Informed by the qualitative findings through the COM-B/TDF model, Phase Two demonstrated the feasibility of developing a tool to measure the needs identified in Phase One. I used a step-wise approach to generate a preliminary 76-item questionnaire. I then improved the quality, logic, and cultural appropriateness of the questionnaire with iterative revisions based on the feedback from cognitive interviewees and my survey committee. Following revisions, of the initial 76 items, six were removed, 55 were modified and 15 remained unchanged. For self-administration, the final questionnaire comprises 70 items in four sections: understanding of PrEP; needs for PrEP service provision; recommendations on future PrEP services in Taiwan and characteristics of respondents. All 14 TDF domains

were measured by at least one item in the section of PrEP service provision needs. Except for the Emotion domain, all TDF domains were covered by items designed to identify stakeholders who could satisfy CSTIPs' needs. I present a theory-informed, context-tailored Traditional Chinese questionnaire in Appendix 7 with an English translation in Appendix 8.

In the following sections I identify the key findings under each of my three Objectives.

8.2 Describing the context of the Taiwan CDC National PrEP Programme (Objective 1)

My thesis documents a number of contextual determinants of performance of the National Programme and PrEP implementation in Taiwan overall. One crucial factor is the financing mechanism of the National Programme. My analyses show that the Programme subsidised 2000 individuals with publicly funded PrEP, half of which was donated by Gilead, the pharmaceutical company manufacturing Truvada. This suggests that PrEP implementation in Taiwan relies on a cost-sharing mechanism through public-private partnerships rather than on governmental budgets alone. This reliance can be attributed to the high costs of patented PrEP and the disease-focussed rationale of Taiwan's National Health Insurance (NHI, see Section 2.2.1). To upscale the National Programme and control the expenditure simultaneously, the TCDC needs to conduct price negotiations with Gilead so that the number of subsidised users can be maximised. Unlike other countries which fully or partially subsidise PrEP through public health insurance schemes (e.g., Australia, Thailand and the UK),[69,331,332] Taiwan's NHI is not legally obliged to cover the expenditure of HIV prevention and public health interventions.[101] The findings confirm that the TCDC is the sole governmental funder of the National Programme; Taiwan can be considered one of the countries with limited budgets for HIV prevention that struggle to balance cost-effectiveness with scale-up of PrEP programmes.[161,333] This dual challenge to programmatic financing may explain why the TCDC employed the centralised hospital-based HIV care system rather than commissioning CSTIPs to deliver government-funded PrEP services, given the former may incur less administrative costs than the latter.

Another identified determinant is the involvement of multiple governmental and non-governmental stakeholders in the National Programme. Figure 5.1 illustrates that, in addition to the TCDC, CSTIPs and ID specialists, other key stakeholders include PHBs, medical specialist societies, the Taiwan AIDS Society and the pharmaceutical company Gilead. This finding indicates that various stakeholders play important roles in meeting CSTIPs' needs for PrEP prescribing. Interestingly, stakeholders may not align with but contradict each other whenever interests are conflicting. For instance, the TCDC may focus on recruiting more

CSTIPs to expand PrEP service delivery in the National Programme, whereas pharmaceutical companies may prefer persuading CSTIPs into prescribing PrEP through the private PAP model. Questions on how and to what extent stakeholder intent may heighten or reduce CSTIPs' unmet needs warrant further investigation.

8.3 Identifying needs of CSTIPs for delivering PrEP services to MSM (Objective 2)

The service provision needs of CSTIPs explored in this study are considered with regard to three circumstances: PrEP prescribing, providing healthcare to MSM and joining the National Programme. As this is the first study examining physicians' PrEP prescribing needs in Taiwan, in the following paragraphs, I juxtapose my findings with studies of PrEP providers outside Taiwan to advance knowledge in PrEP implementation.

8.3.1 Capabilities and opportunities as needs

My findings underline the complexity in measuring physician's knowledge about PrEP. Among the sampled CSTIPs, most non-adopters (7 out of 8) had heard of and had a basic understanding of PrEP, which was higher compared to other studies of primary care physicians.[167,168,179] One possible explanation is that information on PrEP had been integrated into the certification training of STIP since 2016. Another possible explanation is that the information on PrEP has spread out among CSTIPs over time. Because two CSTIPs joined the National Programme and others delivered PrEP through private models, knowledge about PrEP may have diffused from PrEP prescribers to non-prescribers, as in the Diffusion of Innovation theory and in line with the findings from previous studies of US physicians' PrEP knowledge.[32,62,168]

A majority of interviewees, particularly non-prescribers, lacked knowledge about the National Programme and event-driven PrEP. Not knowing their eligibility to join the National Programme, physicians miss opportunities to prescribe PrEP to potential beneficiaries. This finding implies a plausible association of needs between knowledge of practice environment (psychological capabilities) and available resources (physical opportunities) for PrEP prescribing. Regarding event-driven PrEP, the current study suggests that daily PrEP providers may have unmet needs for prescribing the event-driven modality, despite the fact that both modalities have been approved nationwide since 2018. Similar results were shown by Power et al.[334] and Smith et al.[335] in Australia, where all physicians have been authorised to prescribe both modalities since 2019. Both studies argue that sexual health physicians and general practitioners experienced in PrEP service delivery might lack clinical competency in prescribing event-driven PrEP. By contrast, Bil et al.[191] speculate that Dutch

physicians perceived themselves competent in prescribing both modalities without preferences. Their survey applied imaginary scenarios rather than actual clinical practices, limiting the validity of this claim. Hence, studies measuring physicians' PrEP knowledge need to consider knowledge gaps in modalities with periodic evaluation of the change in overall knowledge. My final questionnaire has addressed the complexity of PrEP knowledge by designing three items pertaining to knowledge of general principles, daily PrEP and event-driven PrEP.

An interesting finding is that no interviewees referred to physical capabilities as unmet or problematic needs. In the context of PrEP services, physical capability means hands-on procedures involving service delivery,[37] such as taking blood samples for HIV testing and renal function tests. I propose three possible reasons to explain this finding. Firstly, all physicians interviewed were fully aware of and perceived themselves as competent at blood sampling, so they may not perceive unmet physical capabilities. Secondly, needs for physical capabilities could be under-reported due to interviewees' social desirability bias. Since blood draw is deemed as a fundamental skill of medical doctors, interviewees may be reluctant to express their perceived incompetence or lack of confidence. Although studies outside Taiwan have not reported blood sampling as a barrier for physicians to delivering PrEP services,[164–166] it is possible that some physicians may need to refamiliarise themselves with procedural skills involved in PrEP care. Finally, CSTIPs may not view blood sampling as their responsibility because they have shifted this task to other professionals. This explanation is supported by some interviewees arguing that their non-physician colleagues (i.e., nurses) are accountable for blood sampling.

As PrEP services may involve task shifting activities (e.g., blood draws), the current study also highlights the importance of physicians' communication skills for PrEP prescribing. Communication skills are revealed in two dimensions. First, as PrEP services comprise an array of activities, physicians require communicative skills to persuade non-physician professionals into supporting their service provision. Nevertheless, interprofessional communication in PrEP prescribing receives little attention in the literature on physicians but more in studies of nurse prescribers.[147,335] In a Canadian study,[147] around half of the surveyed nurse prescribers reported insufficient support from their physician colleagues for delivering PrEP services. As most CSTIPs in Taiwan work in solo practices, I contend that the extent of their need for interprofessional communication skills requires further exploration.

Second, skills in patient communication are crucial for successful PrEP prescribing. In accord with previous studies,[65,177,178] my finding highlights physicians' discomfort in asking patients about sexual contact and sexual practices, both of which are prerequisites to PrEP eligibility assessment. Such discomfort can be related to two needs being unmet: (1) cultural competency in providing judgement-free health services and (2) multi-faceted stigma towards sex, HIV and PrEP in Taiwan's society that precludes the acquisition of the cultural competency (see Section 8.3.3). In summary, the findings support the importance of communication skills, the extent of which can be measured by the final questionnaire.

Regarding opportunities for delivering PrEP through the National Programme, the study suggests that CSTIPs may not actively discuss PrEP with patients but passively rely on patient requests, which most interviewees considered infrequent. This finding is in line with other studies indicating that lack of patient demand precludes physicians from PrEP prescribing,[169,335] and therefore reduce physicians' capabilities (e.g., diminishing memories or perceived lack of expertise in eligibility assessment and PrEP prescribing). Furthermore, the cause-and-effect dilemma for CSTIPs' missed opportunities (described in Section 5.1.1.4) can be heightened by the National Programme, given users may access PrEP from current providers listed on the TCDC's website instead of service-naïve CSTIPs. Again, this finding points out that opportunities and capabilities for physicians' prescribing behaviour are mutually reinforced and should be taken into considerations in PrEP roll-out.

Another critical need identified by CSTIPs is financial resources for PrEP services, such as resources to offset the costs of procurement, stocking and administrative management. While previous studies consider drug procurement as a challenge to PrEP availability at programmatic or national levels,[11,19,150,161] my finding suggests that financial issues hindered physicians from gaining opportunities for PrEP prescribing. As shown in Section 5.1.1.3, the dual role of some CSTIPs as both doctors and business owners indicates that financial pressure incurred by PrEP provision on clinical operations is a critical concern. Specifically, although costs of PrEP procurement were covered by the National Programme, the expenses in PrEP stocking and administrative process (e.g., claiming reimbursement from the TCDC) may challenge CSTIPs' financial management and thus heighten their unmet needs. Moreover, the financial challenge may be exacerbated by the COVID-19 pandemic. A recent Taiwanese report warns the impact of COVID-19 may devastate the financial robustness of private clinics where most CSTIPs practise.[336] The current finding extends the understanding of service provision needs while underscoring the criticality of financial sustainability to maintain physicians' engagement in PrEP service provision.

8.3.2 Motivation as needs

Following the discussion about financial resources and opportunities, CSTIPs also highlighted their needs for incentives for PrEP prescribing. The study suggests that monetary incentives do motivate physicians for PrEP prescribing, which aligns with other scholars' suggestions on engaging potential providers to deliver PrEP services.[70,175] However, due to the variability and diverse specialities of physicians, it is unclear whether or what amount of monetary incentives may best motivate CSTIPs' prescribing behaviour. To my knowledge, no studies have empirically investigated the effect of varying incentivisation on physicians' PrEP prescribing. Regarding non-monetary incentivisation, other studies suggest that framing PrEP as a cost-effective measure with public health benefits may psychologically motivate non-prescribers to provide PrEP services to those in need.[25,175,337]

This study suggests that positive belief in the consequences of PrEP is pivotal for physicians to prescribe PrEP to their patients. Consistent with the literature,[182,188–191] interviewed CSTIPs were concerned about the negative consequences of PrEP for users and Taiwan's society, such as increases in sexual risk compensation, the transmission of STIs, and PrEP-resistant HIV strains. In addition, contextualised within the National Programme in Taiwan, this thesis presents new evidence on the perceived consequences of PrEP provision at provider levels. Specifically, some interviewees expressed that their distrust in and excessive administrative burden of government-led programmes have deterred them from joining the National Programme. Further, CSTIPs could be demotivated by the co-existing private PrEP programmes (e.g., the PAP and PAPA) as competing alternatives to the National Programme. To my knowledge, the distrust between providers and governments and the potential competition between private and public PrEP programmes are under-reported in the literature. Although Lau et al. have reviewed public and private PrEP programmes in Asia-Pacific, they do not analyse how the relationships of programmes may affect in-country PrEP access.[150] My final questionnaire addresses both needs by measuring the perceived consequences of PrEP prescribing while inquiring about respondents' experiences in private programmes to better approximate to CSTIPs' real-world practice.

Another motivation for CSTIP delivering PrEP services is its congruence with their professional identity. The finding that some CSTIPs did not consider PrEP prescribing within their remits corroborates with the literature of 'purview paradox'[151,152,173] and confirms the existence of such paradox in non-Western contexts. Nevertheless, my findings suggest that the disputes over purview may arise from the underlying professional boundaries between CSTIPs and infectious disease (ID) specialists. As mentioned in Section 5.1.1.1, the historical context of the National Programme has placed PrEP services under the remit of ID

specialists working at hospitals designated for HIV care. This context may result in a 'market closure'[112] of PrEP services and consolidate professional territories. More importantly, my study also discovers that some urologist CSTIPs considered PrEP as their expertise by expressing themselves as 'PrEP professionals', a phenomenon that has not been reported in previous studies of non-HIV specialist physicians.[151,175,176,335] I propose two possible explanations for identity formation. First, it is possible that by claiming PrEP as their expertise, urologists can establish their roles as professional PrEP prescribers and encroach on the medical market of PrEP service. This justification aligns with a systematic review showing that professions may tactically use diversification to establish the services of interest into their clinical fields.[338] A second possible explanation is that the identity of 'PrEP professional' may help physicians gain more patient requests on PrEP through information dissemination. Also, this professional identity may help CSTIPs receive social support or case referral from ID specialists at hospitals, which strengthens their capability, opportunities for and professional confidence in PrEP service delivery. The issues of professional identity and confidence in PrEP prescribing are included in the final questionnaire, enabling further investigations.

8.3.3 The profound influence of PrEP stigma on physicians' needs

Corresponding to Huang et al.'s study of Taiwanese PrEP users and research in physicians outside Taiwan,[61,62,65,68] this study notes that PrEP stigma may amplify physicians' unmet needs by precluding both opportunities and motivation for delivering PrEP services to MSM. Specifically, PrEP stigma may heighten the gap between optimal professionalism (e.g., stigma-free practices) and actual clinical practices suffused with multi-faceted stigma and prejudices towards MSM, STIs and HIV. Also, I argue that CSTIPs' lack of engagement with the National Programme may be attributed to their belief that PrEP users follow socially unfavourable lifestyles. My argument is congruent with Hildebrandt et al.'s hypothesis on how stigma attached to specific lifestyles may affect public perspectives on government-funded PrEP programmes (see Section 2.1.2).[58] Although Hildebrandt et al. conclude that the UK public might not ascribe HIV-related stigma to NHS-funded PrEP, I contend that their findings may not apply to situations in Taiwan, where HIV stigma is perpetuated by collective moral association with Confucianism.[73,74] When making decisions on prescribing PrEP to patients, the interviewed CSTIPs are cognizant of multi-levelled PrEP stigma, which may disincentivise them from satisfying service provision need. Hence, the impact of social stigma on PrEP prescribing and services through the National Programme requires further explorations.

Regarding ways to mitigate PrEP stigma perceived by providers, the most commonly suggested strategies in literature are: (1) facilitating thought-provoking discussion about stigma towards HIV and sexuality in continuing education events, (2) reframing the public messages of PrEP by using benefit-gain rather than risk-averse languages and (3) promoting PrEP to the general public rather than exclusive 'high-risk' populations.[52,54,55,62,70] These strategies can provide the TCDC with insights into designing evidence-informed interventions for upscaling PrEP implementation in Taiwan.

8.4 Designing a questionnaire to measure the unmet needs of CSTIPs (Objective 3)

8.4.1 Items measuring physician's knowledge about PrEP

The final questionnaire includes three items with factual statements to measure physicians' knowledge of both daily and event-driven PrEP. These items are adapted from the EMIS-2017 survey, and their applicability to assessing knowledge has been supported by studies of MSM.[339,340] My adaptation to the items has been validated by both cognitive interviewees and the survey panel. However, it is worth noting the difference between question forms. Regarding question stems, previous studies examining providers' knowledge have used self-report knowledge levels (e.g., How would you rate/describe your knowledge of PrEP?)[147,169,187,189,191,196,341] or multiple-choice questions on clinical scenarios.[181,183] Considering the types of response options and strategies for data analyses, published studies have demonstrated four common approaches: (1) Likert scale as numerical data,[187,191] (2) Likert scale as categorical data (e.g., high/medium/low level of knowledge),[147,169,170,189,341] (3) ordinal scale as categorical data[196] and (4) proportions of respondents correctly answering questions.[181,183] Since the appropriateness of measures depends on specific study purposes and research contexts, both the applicability and practicality of my items for PrEP knowledge require confirmation by survey administration in the future.

8.4.2 The choice of demographic variables

My final questionnaire consists of items measuring four characteristics of respondents: medical speciality, type of practice, region of practice and sex/gender. In general, there are fewer demographic variables in my survey than in studies outside Taiwan. Previous studies have claimed associations between providers' PrEP prescribing behaviour and years of clinical practice, experience in serving patients living with HIV and self-identity as sexual minorities,[189,196,341,342] but none of them are addressed in my survey. I justify this abbreviated selection of demographic variables with three arguments. Firstly, since the population data

(i.e., for all CSTIPs) for my chosen variables are publicly available, I can evaluate response bias in the survey data by comparing the distribution of these variables in surveyed physicians to all CSTIPs in Taiwan. Secondly, these variables can be feasibly used to target physicians in future interventions. For example, it is possible to target CSTIPs in specific specialities or geographical regions rather than their sexual minority status or length of medical practice. Lastly, including a 'non-binary' response option for sex/gender may promote CSTIPs' awareness of gender diversity and sexual minorities, whose visibility is unaddressed in Taiwan's sexual healthcare system (described Section 2.2.3). Such awareness might capacitate physicians with cultural competence to better serve patients of various characteristics,[54,343] inclusive of MSM and other key populations.

8.5 Revisiting the applicability of the COM-B/TDF

This study shows that the COM-B/TDF model can serve as a practical framework for identifying and organising physicians' needs for PrEP service delivery. The integrated framework has countered Witzel and Ogden's criticism of COM-B (described in Section 3.3.3) by complementing Bradshaw's taxonomy of needs and acknowledging the diversity and variability of needs at individual levels.[216,257,258]

Nevertheless, based on my empirical findings, I highlight two aspects of the COM-B/TDF model that I believe require revisiting. Firstly, as discussed in Section 8.3.1, my study revealed that the opportunity and capability are interrelated and may determine physicians' PrEP prescribing behaviour. However, the relationship between these two sources of behaviour is not addressed by the COM-B. In their original work and recent revision, Michie and her colleagues claim that both capabilities and opportunities independently modulate the relationship between motivation and the target behaviour and that the target behaviour can further influence individuals' capability and opportunity.[35,344] In my study, the lack of opportunities for delivering PrEP services heightened the insufficiency of physicians' memory and knowledge about PrEP prescribing. My findings also revealed that lacking knowledge of PrEP and the National Programme made CSTIPs miss opportunities for PrEP service delivery. Hence, I argue that capability and opportunity are mutually affected in some circumstances, suggesting potential modification to the COM-B model by acknowledging the bidirectional effects.

Secondly, achieving the target behaviour may not require that all six sub-components of the COM-B and 14 TDF domains be satisfied. The findings suggest CSTIPs may not need both psychological and physical capabilities to deliver PrEP services, so the sub-components

should be understood as theoretical classification rather than prerequisites to behaviour. In addition, the study finds that physicians displaying the target behaviour (i.e., CSTIPs prescribing PrEP through the National Programme) still had unmet needs, such as lacking positive belief in the outcome of PrEP services. This indicates that some needs may outweigh others by becoming key determinants to physicians' PrEP prescribing behaviour, which accords with Atkins et al. who highlight the varied importance of each TDF domain.[240] The same finding also reflects Weatherburn et al.'s report that underscores the ever-changing nature of needs, irrespective of achieving the target behaviour.[203] Hence, when designing behaviour change interventions, implementers and researchers may prioritise specific needs from available evidence rather than aiming to satisfy all domains and behavioural components of the COM-B/TDF model.

8.6 Strengths and limitations of the thesis

8.6.1 Theoretical aspects

This thesis confirms that the COM-B/TDF can practically serve as a conceptual and analytical framework to identify physicians' service provision needs for PrEP prescribing. The final questionnaire is the first instrument devising the COM-B/TDF to measure physicians' needs for PrEP prescribing, which extends the applicability of the model in the literature of needs assessment. Moreover, through developing a context-specific questionnaire in Traditional Chinese with English translation, my thesis demonstrates that the COM-B/TDF can be successfully adapted in non-Western countries for understanding the needs of Taiwanese physicians for delivering PrEP services.

Although the study has underlined the theoretical applicability of the COM-B/TDF, three limitations bear mentioning. First, due to the limited scope of this DrPH thesis, I did not explore how alternative behaviours (e.g., prescribing PrEP through private PrEP models) might affect the capabilities, opportunities and motivation of CSTIPs for joining the National Programme. The relationships between public and private programmes may affect the validity of my qualitative findings. Second, the lack of specificity in TDF domains and constructs challenged my framework analyses. Definitions for sub-constructs in each TDF domain are not provided by its creators,[36,235] and subsequently the results of my framework analysis are more prone to subjective interpretation. For example, interviewees' lack of confidence in PrEP prescribing can be coded as either professional confidence or self-confidence, which represent different domains in the TDF. Although Atkins et al. have advised a pluralistic approach for coding,[240] such ambiguity has increased the difficulty in mapping needs onto the TDF, which may compromise the interpretation of my findings.

Third, whether the applied theory is practical and culturally appropriate for measuring CSTIPs' unmet needs cannot be guaranteed until the administration of the final questionnaire.

8.6.2 Methodological aspects

This thesis exhibits strengths in three methodological aspects. First, guided by the COM-B/TDF model, the findings from document research and in-depth interviews have contributed to questionnaire items measuring the needs of CSTIPs. The theoretical coherence across both phases has strengthened the methodological rigour of my findings. Second, my study applied two complementary methods (i.e., cognitive interviewing with eight CSTIPs and a survey committee review with experts) with three rounds of iterative revisions to improve the quality of the final questionnaire. Both approaches have strengthened my questionnaire's clarity, relevance and cultural appropriateness for measuring CSTIPs' needs for PrEP service delivery. Third, the thesis advances the applicability of cognitive interviews in survey development by creating a novel approach for data analysis. The study has successfully applied the quantity-oriented Cognitive Classification Scheme[323] as a coding framework for data analysis while integrating two methods (i.e., the Scheme and text summary) in reporting the results of questionnaire pretesting. Such integration accords with Willis et al.'s suggestion[322] and may be transferrable to other studies using qualitative pretesting for questionnaire development.

There are several limitations of methods applied in the study. Regarding document research, given more than half of the collected documents were produced by the TCDC, the presented contexts of the National Programme may predominantly reflect the viewpoints and interpretations of the TCDC rather than other stakeholders. Also, the inaccessibility of some censored documents may compromise my overall understanding of the contexts. For instance, the inaccessible official communications between the TCDC and Gilead can potentially unpack how the PrEP quota in the National Programme was determined, which may provide this study with a broader picture for exploring CSTIPs' opportunities for PrEP service delivery. Moreover, data retrieved from documents cannot represent how the Programme was operating but simply show the contexts in which the documents were produced.[260] Thus, contextual factors described in the study may not fully reflect the ever-changing nature of political and social climates surrounding the Programme, and thus limit the comprehensiveness of my findings for reaching Objective 1.

The findings from in-depth interviews should be cautiously interpreted. Here I highlight four limitations. Firstly, both the sampling and recruitment of interviewees were diverse but

unrepresentative. Although I designed a context-tailored sampling framework to enhance the diversity of participants by specialities and geography, the small number of sampled interviewees cannot represent the characteristics of all CSTIPs.

Secondly, the process of recruiting interviewees is prone to several biases. One example is the response bias arising from recruitment. As described in Section 4.3.2.5, half of the sampled invitees refused participation, so physicians being interviewed may be different from study-naïve CSTIPs. The interviewees may be more interested in PrEP, willing to share their perspectives and supportive of government-led programmes. Another example is the social desirability bias. As I reflected in Section 4.5, my advocative role and presence as a researcher in public health can make interviewees inclined to express agreeing or positive comments towards PrEP. Thus, their real needs for PrEP prescribing may not be fully disclosed and identified. When addressing their needs at organisational or structural levels, interviewees may also prefer offering positive or non-judgemental remarks on medical specialist societies recruiting them.

Thirdly, the social desirability bias is worth noting. When inquired by the researcher, interviewees may be reluctant to disclose specific needs that can be considered as unprofessional or politically incorrect; for example, their lack of cultural competencies in providing PrEP services to MSM and challenges in maintaining value-free professional practices without exposing personal prejudices against sex, HIV and sexual minorities. This bias may explain why some interviewees preferred articulating the needs of other physicians rather than themselves, a phenomenon compatible with the findings in previous studies.[61,176] Lastly, the accounts of interviewees may not align with what they require and how they practise at clinics, so my findings cannot be interpreted as observed needs. This intrinsic limitation of both document research and in-depth interviews may be mitigated at the population level by administration of my final questionnaire and by further observational methods.

The process of questionnaire pretesting also had limitations. The first is the small number and non-representative sampling of cognitive interviewees due to the challenges I faced during the COVID-19 pandemic (justified in Section 6.3.5.2). Therefore, feedback from cognitive interviewees cannot represent the diversity of CSITPs but rather the perspectives of physicians practising in Southern Taiwan where I could recruit. The second limitation emanates from the online format of interviews. Compared with face-to-face interviews, online interviews may not fully capture the non-verbal responses of participants, which researchers use for probing and prompting. Interviewees might also feel more unnatural in

participating in online interviews than face-to-face, so they could be less engaged in evaluating items. In addition, given all interviewees were asked to assess 76 items in one interview, the time allocated for each item and the overall layout of the questionnaire was short. The limited depth of CSTIPs' feedback may compromise the quality of my questionnaire pretesting by underestimating the number of problems in the questionnaire. Moreover, the fact that four cognitive interviewees were recruited from Phase One participants may create additional bias in questionnaire pretesting, given they had prior knowledge of the study. Nevertheless, my decision on sampling is justified by recognising the diversity of feedback received and by strengthening CSTIPs' engagement in research activities (see Section 6.3.5.2). The third limitation is the subjectivity of the questionnaire revisions. Despite employing cognitive interviews and survey panel reviews to improve the quality of my questionnaire, I cannot fully mitigate the influence of my preferences when removing or revising items. Hence, the final questionnaire may not fully reflect CSTIPs' perspectives on items.

8.6.3 The qualitative findings in Phase One

This thesis advances knowledge of PrEP implementation in four directions. Firstly, it is the first study demonstrating the role of CSTIP as suitable PrEP providers in increasing PrEP access in Taiwan. Secondly, this study pioneers the qualitative exploration of physicians' needs for PrEP prescribing and their perceptions of PrEP stigma in East Asia. Thirdly, the thesis has identified several under-explored service provision needs of providers and contributes to the literature by extending the understanding of PrEP implementation. Lastly, displaying theoretical coherence, methodological integration and transparent reporting, I contend that my research holds strong quality in terms of its credibility, trustworthiness and transferability.[200] The results provide practical insights to other countries having similar contexts (e.g., government-funded PrEP programmes) or governments encountering challenges in upscaling PrEP implementation (e.g., lacking physicians in delivering accessible PrEP services).

However, the findings should be cautiously interpreted. To begin with, the limited number of interviewees compromises the generalisability of my findings to all CSTIPs in Taiwan. The needs of non-sampled CSTIPs may remain uncovered and thus limit the usefulness of my findings. Subsequently, the findings may not reflect the service provision needs of other PrEP providers in Taiwan, such as hospital-based physicians (e.g., ID specialists and non-ID STIPs), community-based physicians who are not STIPs and potential PrEP providers identified in the literature (i.e., pharmacists, nurses and trained providers in key population-led organisations).[15,143–145] Next, my study only indicates physicians' perceived needs for

prescribing oral PrEP rather than other innovative routes of administration, such as topical devices (e.g., vaginal rings) and long-acting intramuscular injection (recommended by the US CDC in December 2021).[345–347] Moreover, my findings highlighted physicians' needs for prescribing PrEP to MSM rather than to other men or women. As the Taiwan national PrEP guideline[12] has endorsed women's PrEP use, physicians may have different needs for delivering PrEP to women. Studies outside Taiwan have underlined the pivotal role of women/female users in nationwide PrEP scale-up.[54,337,345] Future research in exploring the delivery to and engagement with PrEP services among female users is warranted.

Finally, identifying the needs of providers may merely improve PrEP access instead of increasing the overall uptake of PrEP beneficiaries in Taiwan. The thesis focusses on insights into increasing PrEP accessibility by increasing the engagement of providers with the National Programme. In reality, scalable PrEP implementation requires fulfilling the needs of providers, users and governmental institutions.

8.6.4 The developed questionnaire in Phase Two

To my knowledge, the final questionnaire is the first instrument informed by the COM-B/TDF model to investigate physicians' needs for PrEP prescribing. My detailed reporting of steps in questionnaire pretesting demonstrates the transparency and credibility of the instrument.

There are two limitations of the applicability of my questionnaire. For one, the questionnaire design is based on the 2018-2020 National Programme, which may not reflect the ever-changing PrEP policies in Taiwan nor the post-COVID-19 contexts. After a three-month discontinuation, the TCDC has reinitiated the National Programme in April 2021 by providing differentiated financial subsidies to key population groups (e.g., 20 free pills every three months for MSM and 30 free pills every month for HIV-negative females in serodiscordant relationships), given that Gilead terminated voluntary donations.[348] Hence, I expect that physicians may address additional needs due to the financial challenges in the 2021 National Programme, the consequence of COVID-19 mass quarantine and adjusted clinical practices in the COVID-19 pandemic.[336,349] For another, adapting the questionnaire to other contexts (e.g., using the questionnaire in other Chinese-speaking countries) requires context-specific revisions that recognise regional, cultural and semantic differences. Since my questionnaire is developed in Traditional Chinese, the applicability and adaptability of its English version warrant validation by future studies investigating the needs of PrEP providers.

8.7 Implications and conclusions

8.7.1 Implications for upscaling PrEP implementation in Taiwan

This thesis has identified capabilities, opportunities and motivation that CSTIP may require to provide PrEP services to MSM and other populations who can most benefit from PrEP. The findings imply that CSTIPs are the key providers for both roll-out of the National Programme and scale-up of PrEP implementation in Taiwan. Also, engaging CSTIPs in Taiwan's PrEP care continuum may increase the availability of PrEP services and create an inclusive PrEP epistemic community,[114] which constitutes all potential/current users, providers and organisations interested in promoting PrEP for HIV prevention. Together with hospital-based ID specialists, CSTIPs can provide professional and decentralised PrEP services, and therefore maximise the impact of PrEP on the HIV epidemics in Taiwan.

Having unsatisfied needs, CSTIPs may never provide adequate PrEP services in Taiwan. Based on the service provision needs and pertinent stakeholders identified in Chapter 5, I propose a visualisation of Taiwan's PrEP epistemic community with actionable recommendations on meeting CSTIPs' needs for providing PrEP services: (Figure 8.1):

CSTIPs can become more capable PrEP prescribers to users if:

- the TCDC commissions medical specialist societies to provide educational material on PrEP when certifying new CSTIPs;
- medical societies offer CSTIPs information on PrEP regimens, reflections on PrEP stigma and updated information on available programmes for service delivery in continuing education;
- the TCDC announces a streamlined, standardised and CSTIP-tailored PrEP prescribing guidance;
- the Taiwan AIDS Society and medical societies collaboratively support knowledge exchange between CSTIPs and infectious disease specialists.

CSTIPs can obtain more opportunities for PrEP service provision when:

- the pricing of PrEP is reduced through the TCDC's negotiation with pharmaceutical companies or the introduction of market competition (e.g., compulsory licensing of generic PrEP);
- the TCDC sustains the amount of funding allocated for as well as the number of subsidised users in the National Programme;
- the TCDC streamlines the administrative process of PrEP provider registration;

- they receive social support from ID specialists and other current prescribers promoted as 'PrEP champions' by medical societies;
- PrEP users can overcome perceived stigma towards PrEP and request PrEP services from CSTIPs.

CSTIPs can have greater motivation to provide PrEP services if:

- the TCDC continue providing them with monetary and non-monetary incentivisation;
- the TCDC reduces their administrative burdens on providing government-funded PrEP services (e.g., expediting reporting and the process of claiming reimbursement);
- all stakeholders aim to mitigate PrEP stigma by reinforcing benefit-gained rather than risk-oriented public messages on PrEP and avoiding stereotyping PrEP users with specific demographics or lifestyles;
- they and ID specialists break down perceived professional boundaries by forming a coalition of PrEP providers to strengthen their professional identity and confidence;
- all stakeholders synergistically facilitate the formation of a PrEP epistemic community while supporting the expansion of PrEP services to ensure that all individual beneficiaries can access PrEP in Taiwan.

8.7.2 Implications for future research

As this study has developed a context-specific questionnaire to measure the unmet needs of CSTIPs in Taiwan, administering the questionnaire is warranted to support the policy-oriented nature of my DrPH thesis. My plans for survey administration are outlined in Section 6.4. The survey findings are anticipated to (1) measure the needs of CSTIPs for providing PrEP services and (2) serve as representative quantitative data justifying the qualitative themes identified from my thesis.

This thesis has provided novel findings and practical insights into understanding the service provision needs of providers. It may encourage researchers in health psychology or sociology to explore the relationships between needs and to extend the knowledge front of physicians' PrEP prescribing behaviour. It may also inspire future research in PrEP implementation by mapping out the unaddressed capabilities, opportunities and motivation of physicians in various contexts. Moreover, my qualitative findings and theory-informed questionnaire may encourage both implementation scientists and cross-disciplinary researchers to develop needs-based interventions to increase the number of physicians who provide potential beneficiaries with PrEP services. Ultimately, a comprehensive engagement

with need-met providers in the PrEP care continuum will enhance service availability for users, mitigate the stigma towards PrEP and thus maximise the positive impacts of PrEP on the HIV pandemic.

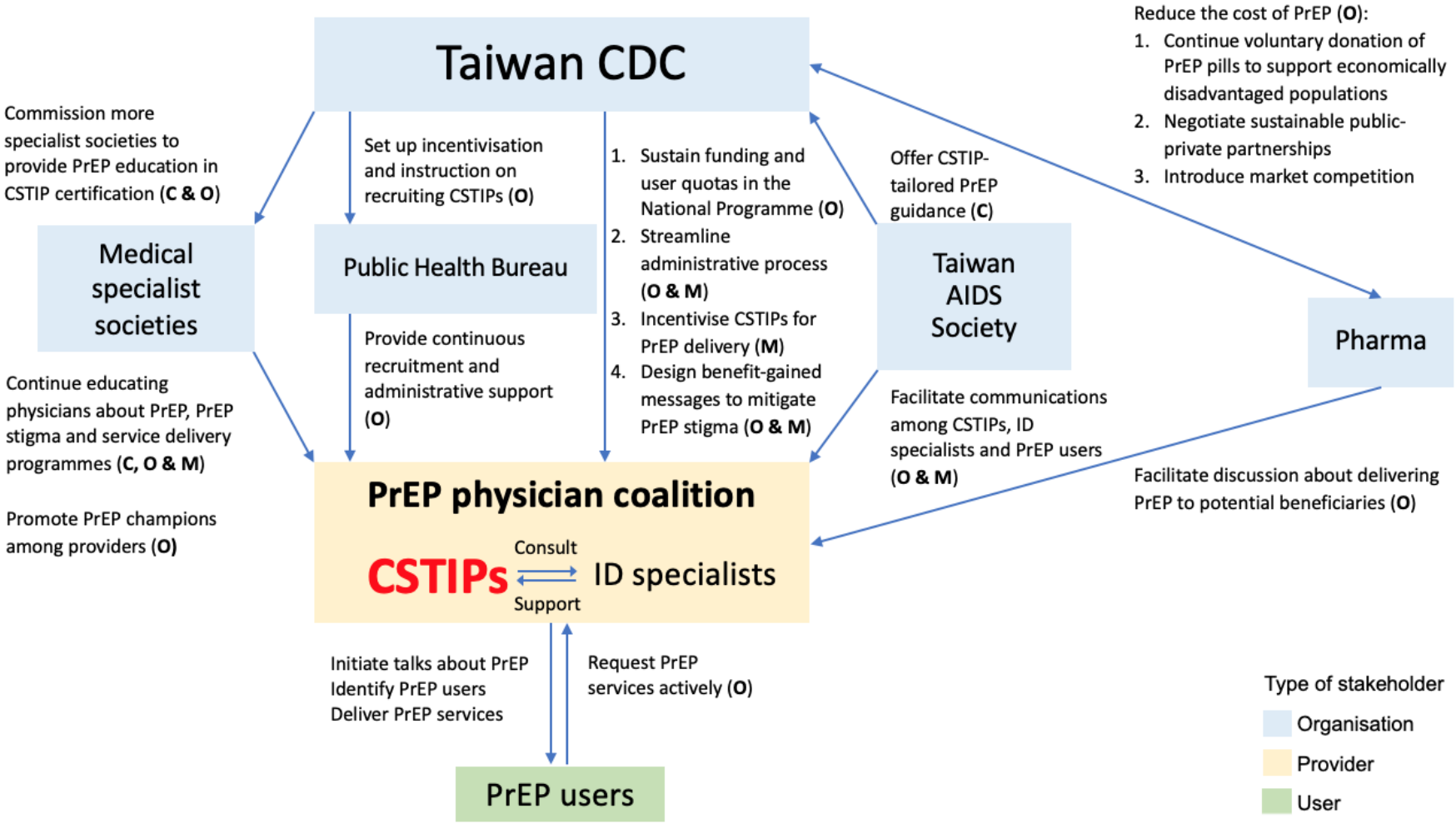


Figure 8.1 A schematic proposal for Taiwan's PrEP epistemic community with recommendations on meeting the service provision needs of community-based sexually-transmitted-infection-friendly physicians (CSTIPs)

PrEP: Pre-exposure prophylaxis; CDC: Centers for Disease Control; C: Capability; O: Opportunity; M: Motivation; ID: Infectious disease.

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Appendices

Appendix 1. **Research notes template for document research**

Research Note

Name of organisation:

Type of document:

Date of access:

The main focus of document:

Reference to the policy context:

Reference to the social context:

Identify needs based on the COM-B/TDF model:

Reference to capabilities of PrEP providers:

- Physical
- Psychological

Reference to opportunities of PrEP providers:

- Physical
- Social

Reference to motivation of PrEP providers:

- Reflective
- Automatic

Discussion about PrEP service delivery

Suggestions on how to expand PrEP service delivery

Evaluation of the document:

- Ownership and authorisation of the document
- Reasons to produce the document
- Potential biases
- Evidence supporting this document
- Interpretations

Quotes from this document:

Other notes and comments:

Appendix 2. **Participant information sheet and consent form**

Participant Information Sheet

03 March 2019

Version 1

You are invited to participate in a study on what physicians need to provide Pre-exposure prophylaxis (PrEP) services for HIV prevention in Taiwan. This study will be conducted by Yen-Hao Chu, a student studying the Doctor of Public Health programme at the London School of Hygiene & Tropical Medicine (LSHTM) in the UK. It is important for you to understand why the research is necessary and what it will involve before making any decisions. Please take time to read the following information carefully.

Study title: *Are we PrEPared to provide?* Developing a theory-informed survey to measure the needs of Taiwan's community-based 'Sexually-Transmitted-Infection-Friendly Physicians' to deliver HIV pre-exposure prophylaxis (PrEP)

1. **Background of the study**

PrEP is highly effective at preventing HIV in populations at risk. Although the World Health Organization has recommended countries to provide PrEP services, PrEP implementation remains slow in Taiwan, where the HIV epidemics are concentrated in men who have sex with men (MSM). Unavailability of and difficult access to PrEP have been reported as barriers facing Taiwanese MSM. Since September 2018, the Taiwan Centers for Disease Control (Taiwan CDC) has scaled up the PrEP implementation by subsidising 2,000 population at-risk of HIV infection with free PrEP pills and by expanding sites for PrEP services from five hospitals to 38 healthcare facilities nationwide.

2. **The importance of the study**

Providers play a key role in healthcare innovations including PrEP. Medical doctors are the sole legitimate PrEP providers in Taiwan, but what they require to deliver PrEP services remains unknown. Understanding the needs of physicians, especially those who are community-based sexually-transmitted-infection-friendly physicians (CSTIPs), will be pivotal for the Taiwanese government to planning nationwide PrEP service delivery in the future.

3. Purpose of the study

This study aims to provide policy recommendations and clinical implications on how to maximise CSTIPs' contributions to PrEP implementation in Taiwan. Three objectives of this

study are:

- To describe the policy and social context of the Taiwan CDC PrEP programme;
- To identify perceived needs of CSTIPs for delivering PrEP services to MSM in Taiwan;
- To measure the extent of CSTIPs' unmet needs for providing PrEP services to MSM;

4. **Why have I been chosen?**

The principal investigator is seeking a variety of views from CSTIPs. Contacts have been obtained from the Taiwan CDC's website.

5. **Your participation in the study**

Your decision to participate in this research is voluntary and completely out of your will. Your participation will offer important insights into physicians' requirements for providing PrEP services in Taiwan. You can withdraw from the study at any time without giving any reasons by informing the researcher, and all your data collected will be discarded.

6. **What will the study involve?**

The study will involve one-to-one interviews conducted by the researcher. If you agree to take part in this project, you will be invited by the researcher to express your perspectives. Interviews will be conducted at your preferred location and will last from 40 to 60 minutes. With your consent, the conversation will be audio-recorded. All audio-recordings will be stored in the researcher's encrypted device and used only for written transcriptions. If you are not comfortable with being recorded, the interviewer will take notes during the interview instead.

7. **Will my participation be confidential?**

Your confidentiality will be strictly maintained. You will only be identified as a study number assigned to you. Your name or any identifiable information will never be used and presented in any document. Any recorded information that you provide during this interview will be stored in an encrypted drive based at LSHTM. The typed transcripts from your interview will not include any identifiable information, such as your name, the name of your clinic and addresses. All transcripts, quotes and recordings will be accessed only by the researcher. Said quotes will not be attributed to you at any moment. Collected information will be only used to develop a survey questionnaire and for the researcher's write-up of his doctoral thesis. Ten years after the study has been completed, all the transcripts and audio-recordings will be destroyed.

8. **What will happen to the results of the study?**

The results will be used to develop a questionnaire to assess the needs of all CSTIPs in

Taiwan as the listed study objective. The results of the study will be used to prepare a doctoral thesis as part of the requirements of the DrPH programme at LSHTM.

9. **Study approval**

This study has been approved by the Human Experiment and Ethics Committee of National Cheng Kung University in Tainan, Taiwan and by the LSHTM Research Ethics Committee in London, the United Kingdom.

Thank you for reading this information sheet. If you have any questions or would like to have more information on this study, please do not hesitate to contact me.

Yen-Hao Chu (Isaac)

Yen-hao.chu1@lshtm.ac.uk

Tel: (+886) 0921-527-789

Consent Form

Title of Project: Are we PrEPared to provide? Developing a theory-informed survey to measure the needs of Taiwan's community-based 'Sexually-Transmitted-Infection-Friendly Physicians' to deliver HIV pre-exposure prophylaxis (PrEP)

Name of Researcher: Yen-Hao Chu (Isaac)

Please initial here

I confirm that I have read and understood the Participant Information Sheet dated 03 March 2019 (version 1). I have considered the information, asked questions about the study and received satisfactory answers given by the researcher.	
I understand that my participation is voluntary and that I am free to withdraw from the study anytime by informing the researcher.	
I consent to the interview being recorded. I understand that the researcher will keep the quotations confidential and non-identifiable to others. My quotations in papers or reports will not be attributable to me.	

I agree to participate in the study.

Name of Participant	Date	Signature

Researcher	Date	Signature

Appendix 3. **Interview topic guide**

CSTIPs who have **not** provided PrEP services (non-prescribers)

Explain the consent with participants and answer their questions

Background questions

- Could you tell me what your speciality is?
- How long have you been practising as a sexually transmitted infections friendly physician?
- Approximately how often do you see patients with STIs?

Psychological and physical capability

1. Have you heard of PrEP?
    a. If yes, how have you known it? Could you tell me more about your understanding of PrEP? (Probe for the eligibility of PrEP users, effects of PrEP, side effects of PrEP)
    b. If no, explain what PrEP is to the participants.

Automatic motivation

2. How do you feel about PrEP in general? What about MSM using PrEP to prevent HIV infection?

Reflective motivation

3. What do you think about PrEP in general? (probe: benefits and harms to interviewees themselves and their MSM patients)
4. Do you think PrEP has been promoted well in Taiwan? Why/ why not?
5. Do you think PrEP can be provided in community-based clinics? Why/why not
6. Will you be willing to prescribe PrEP? Why or why not?
7. Do you think what kind of clients in your clinic can benefit from PrEP?

Physical and social opportunity

8. Do you think what factors will make you more willing to provide PrEP services to MSM? How will these factors affect you?
   (Probe: skills, social support, resources in environments, peer pressure from other physicians, regulations from medical associations or Taiwan CDC)
9. Do you think what factors will make you less willing to provide PrEP services to MSM? How will these factors affect you?

(Probe: skills, social support, resources in environments, peer pressure from other physicians, regulations from medical associations or Taiwan CDC)

10. What do you think other CSTIPs are doing in terms of PrEP?
    (Probe: why is that? Do you think it is a norm among CSTIPs?)
11. Which of the following ideas will influence your decision in providing PrEP services to MSM?

Knowledge	Beliefs about capabilities
Skills (cognitive and interpersonal)	Optimism
Memory, attention and decision processes	Beliefs about consequences
Behavioural regulation	Intentions
Skills (physical)	Goals
Social influences	Reinforcement
Environmental resources	Emotion
Social/professional role and identity	

12. Do you think what kind of strategies can encourage more CSTIPs to provide PrEP services? How to achieve them?
13. Do you think what kind of policy governments can do to encourage more CSTIPs to provide PrEP services? How to achieve them?
14. Is there anything you would like to share with me? Thank you for sparing your precious time with me.

CSTIPs who have provided PrEP services (prescribers)

Explain the consent with participants and answer their questions

Background questions

- Could you tell me what your speciality is?
- How long have you been practising as a sexually transmitted infections friendly physician?
- Approximately how often do you see patients with STIs?

Psychological capability

1. Could you share with me how have you known about PrEP? Tell me more about your understanding of PrEP? (Probe: the eligibility of PrEP users, effects of PrEP, side effects of PrEP)
2. Is there anything or any system to monitor whether or not you prescribe PrEP?

Automatic motivation

3. How do you feel about PrEP in general? What about MSM using PrEP to prevent HIV infection?

Reflective motivation

4. What do you think about PrEP in general? (Probe: benefits and harms to interviewees themselves and their MSM patients)
5. Do you think PrEP has been promoted well in Taiwan? Why/ why not?
6. Do you think what kind of clients in your clinic can benefit from PrEP?
7. To what extent providing PrEP services is a priority for you in your daily work?

Physical and social opportunity

8. Do you think what factors will make you more willing to provide PrEP services to MSM? How will these factors affect you?
   (Probe: skills, social support, resources in environments, peer pressure from other physicians, regulations from medical associations or Taiwan CDC)
9. Do you think what factors will make you less willing to provide PrEP services to MSM? How will these factors affect you?
   (Probe: skills, social support, resources in environments, peer pressure from other physicians, regulations from medical associations or Taiwan CDC)
10. What do you think other CSTIPs are doing in terms of PrEP?
    (Probe: why is that? Do you think it is a norm among CSTIPs?)

11. Which of the following ideas will influence your decision in providing PrEP services to MSM?
12. Do you think what kind of strategies can encourage more CSTIPs to provide PrEP services? How to achieve them?
13. Is there anything you would like to share with me? Thank you for sparing your precious time with me.

Appendix 4. **Ethical approval from LSHTM**

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
United Kingdom
Switchboard: +44 (0)20 7636 8636

www.lshtm.ac.uk

Observational / Interventions Research Ethics Committee

Mr YENHAO CHU
LSHTM

20 May 2019

Dear Yenhao,

Study Title: Are we PrEPared to provide? A mixed-methods study on the needs of community-based 'Sexually Transmitted Infection Friendly Physicians' in Taiwan to provide HIV pre-exposure prophylaxis (PrEP) services

LSHTM Ethics Ref: 17128

Thank you for responding to the Observational Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Information Sheet	Participant information sheet_interviews	03/03/2019	1
Information Sheet	Consent form_interview	03/03/2019	1
Investigator CV	Certificate of ethics training_YENHAO CHU	15/03/2019	1
Information Sheet	Questionniare (information and consent form)	21/03/2019	1
Investigator CV	CV_YEN-HAO CHU	21/03/2019	1
Protocol / Proposal	YEN-HAO CHU_DrPH Review document_submission_final	22/03/2019	1
Protocol / Proposal	Document sheet	22/03/2019	1
Protocol / Proposal	Interview topic guides	22/03/2019	1
Information Sheet	Participant information sheet and consent form for interview (Mandarin Chinese)	25/03/2019	3
Advertisements	flyer_Mandarin	28/03/2019	1
Covering Letter	Cover letter to Ethics Committee_Ref 17128	08/05/2019	1

After ethical review

The Chief Investigator (CI) or delegate is responsible for informing the ethics committee of any subsequent changes to the application. These must be submitted to the Committee for review using an Amendment form. Amendments must not be initiated before receipt of written favourable opinion from the committee.

The CI or delegate is also required to notify the ethics committee of any protocol violations and/or Suspected Unexpected Serious Adverse Reactions (SUSARs) which occur during the project by submitting a Serious Adverse Event form.

An annual report should be submitted to the committee using an Annual Report form on the anniversary of the approval of the study during the lifetime of the study.

At the end of the study, the CI or delegate must notify the committee using an End of Study form.

All aforementioned forms are available on the ethics online applications website and can only be submitted to the committee via the website at: http://leo.lshtm.ac.uk

Additional information is available at: www.lshtm.ac.uk/ethics

Yours sincerely,

[redacted]

Professor John DH Porter
Chair

ethics@lshtm.ac.uk
http://www.lshtm.ac.uk/ethics/

Improving health worldwide

Appendix 5. **Ethical approval from National Cheng Kung University**

文件編號：8800-4-07-001
表單編號：表單 58

Institutional Review Board
National Cheng Kung University Hospital
138 Sheng-Li Rd, Tainan 704, Taiwan R.O.C.
TEL:886-6-2353535 ext.3635 FAX:886-6-2388190

國立成功大學醫學院附設醫院 A089th
第一人體研究倫理審查委員會
台灣.台南市勝利路138號
E-mail:em73635@mail.hosp.ncku.edu.tw

同意人體研究證明書

研究計畫名稱：以混合研究法分析社區診所性病友善醫師提供暴露愛滋病毒前預防性投藥 (PrEP) 服務之行為需求

計畫編號/本會編號: -- / A-ER-108-103

研究執行期間:民國 *108* 年 *04* 月 *20* 日至民國 *108* 年 *12* 月 *31* 日

本次核准期間:民國 *108* 年 *04* 月 *20* 日至民國 *108* 年 *12* 月 *31* 日

核准內容/版本：

1. 計畫書：版本：第一版；日期：2019.3.20
2. 人體研究說明書：版本：第一版，日期：2019 年 3 月 27 日
3. 網路問卷：版本：第一版；日期：2019.3.20
4. 訪談大綱：版本：第一版；日期：2019.3.20
5. 免除簽署書面同意書：於網路問卷說明頁面進行告知，受試者經由點選"同意"選項表達同意參與研究之意願。

試驗執行機構：國立成功大學

研究計畫主持人：莊佳蓉教授 (公共衛生學科暨研究所)

共(協)同主持人：柯乃熒教授、朱彥豪

核准樣本數：國內問卷:610 人、訪談 12 人；收案超過原核准樣本範圍前，請向本會提出申請並經核准。

本會經中央衛生主管機關查核通過，組織與執行皆遵照法令及主管機關規範。

本計畫已於民國 ***108*** 年 ***04*** 月 ***16*** 日經本院人體研究倫理審查委員會審核通過，本次核准執行期間至民國 ***108*** **年** ***12*** **月** ***31*** **日**，特此證明。

多期程之研究請於民國 ***109*** 年 ***11*** 月 ***30*** 日前繳交追蹤(期中)審查報告，追蹤(期中)審查於**核准期間**末日尚未獲得通過者，除維護受試者安全之必要作為外，於**核准期間**末日後應停止執行所有受試者相關之研究程序。

已完成之研究應於**研究執行期間**末日後三個月內繳交結案報告，除維護受試者安全之必要作為外，於**核准期間**末日後應停止執行所有受試者相關之研究程序。

計畫主持人逾**核准期間**末日仍未繳交報告者，列入逾期名單，本會將寄發本研究案之中止/終止通知書。逾期名單將提本會審查會議報告，經會議決議後，本會將暫停受理名單上人員所主持之新案審查申請，迄繳交應繳報告並經本會會議審查通過後，始得受理其新案審查申請。

追蹤/結案報告請以書面繳交；報告書請逕送本院人體研究倫理審查委員會辦公室；報告表格最新版本請至本會網頁(http：// www.ncku.edu.tw/ ~nckuhirb)下載。

研究計畫內容有任何變更或修正(含**研究執行期間**變更)，須於**研究執行期間**內向本會提出申請，本會不受理未在**研究執行期間**內提出之變更或修正案。變更或修正未獲本會核准前，須依原核准範圍執行。

已獲本會同意之研究案，因故未開始執行或不繼續執行者，應申請中止/終止。

不論研究進行中或研究完成後，受試者若發生任何不良反應，須依 GCP 規範通報。

此致

國立成功大學醫學院附設醫院
人體研究倫理審查委員會
主任委員 [redacted]

中 華 民 國 108 年 4 月 16 日

經第 B053 次大會通過版

Institutional Review Board
National Cheng Kung University Hospital
138 Sheng-Li Rd, Tainan 704, Taiwan R.O.C.
TEL:886-6-2353535 ext.3635 FAX:886-6-2388190

國立成功大學醫學院附設醫院
第一人體研究倫理審查委員會
台灣.台南市勝利路138號
E-mail:em73635@mail.hosp.ncku.edu.tw

A089th

Human Study Approval

Date: 2019.04.16

Title: Are we PrEPared to provide? A mixed-methods study on the needs of community-based 'Sexually Transmitted Infection Friendly Physicians's in Taiwan to provide pre-exposure prophylaxis (PrEP) services for HIV prevention.
Protocol No/ IRB No: --/ A-ER-108-103
Period of Project: From 2019.04.20 to 2019.12.31
Period of Approval: From 2019.04.20 to 2019.12.31
Content/Version:

1. Protocol: Version: 1, Date: 2019.03.20
2. Informed Consent Form: Version 1, 2019.03.27
3. Internet questionnaire: Version: 1, Date: 2019.03.20
4. Interview Guide: Version: 1, Date: 2019.03.20
5. Waive Written Consent: Use internet questionnaire to explain the research and gain consent at the first page.

Institute: National Cheng Kung University
Investigator: Prof. Carol Strong (Department of Public College)
Co- Investigators: Prof. Nai-Ying Ko, Yen-Hao Chu

Approved Number of Participants: Taiwan Questionnaire 610 Persons, Interview 12 persons. If the number of participants enrolled exceeds the approved number, please submit an application for amendment and approval.

The Institutional Review Board of National Cheng Kung University Hospital (NCKUH) is organized and operated according to the laws and regulations of ICH-GCP and of Central Competent Authorities.
This project is reviewed and approved by NCKUH IRB in 2019.04.16. The period of approval is granted until 2019.12.31.
Regarding multi-period project, please submit the Interim Report before 2019.11.30. If the approval of the interim report is not granted on its expiry date, except safeguarding the health of the participants, the research is suspended.
Regarding completed project, the Final Report shall be submitted within three months of its approved expiry date. Except for the health of the participants, all the procedures of the project shall be terminated on its approved stated deadline.
If PI does not submit the Interim/Final Report on time, he/she will be recorded in the overdue list and received the suspension/ termination notice from NCKUH IRB. The overdue list will be reported to the IRB. After the resolution of the board meeting, NCKUH IRB will suspend all the new projects applied by PI until the Interim/Final Report is submitted.
Please submit the Interim/Final Report in written form and send to NCKUH IRB office. The lastest application forms can be downloaded in its website (http：// www.ncku.edu.tw/ ~nckuhirb)
Any changes or amendments to the project (including the project period), please submit an amendment application to NCKUH IRB within its approved period. Any changes or amendments in any other way will not be accepted. Before the approval of the amendment application, the project is carried out according to its previously approved plan.
For some reasons projects granted approval by NCKUH IRB couldn't be implemented, PI shall apply for suspension/termination.
During or after the project is completed, please report any unfavorable occurrence in a human study particant according to GCP.

Yours sincerely,
Thy-Sheng Lin M.D.
Chair

[redacted]

Institutional Review Board
National Cheng Kung University Hospital
經第 B053 次大會通過版

Institutional Review Board
National Cheng Kung University Hospital
138 Sheng-Li Rd, Tainan 704, Taiwan R.O.C.
TEL:886-6-2353535 ext.3635 FAX:886-6-2388190

國立成功大學醫學院附設醫院
第一人體研究倫理審查委員會
台灣.台南市勝利路138號
E-mail:em73635@mail.hosp.ncku.edu.tw

同意計畫修正證明書

計畫名稱：以混合研究法分析社區診所性病友善醫師提供暴露愛滋病毒前預防性投藥(PrEP)服務之行為需求

計畫編號/本會編號：-- / A-ER-108-103

研究執行期間：民國 ***108*** 年 ***04*** 月 ***20*** 日至民國 ***109*** 年 ***12*** 月 ***31*** 日

本次核准期間：民國 ***108*** 年 ***04*** 月 ***20*** 日至民國 ***109*** 年 ***04*** 月 ***19*** 日

核准內容/版本：

1. 計畫書：版本：二，日期：2019 年 11 月 29 日
2. 受試者同意書：版本：二，日期：2019 年 10 月 23 日
3. 增加收案人數至 20 人
4. 展延研究期限至民國 109 年 12 月 31 日

試驗執行機構：國立成功大學

研究計畫主持人：莊佳蓉副教授 (公共衛生學科暨研究所)

共(協)同主持人：柯乃熒教授、朱彥豪

本會經中央衛生主管機關查核通過，組織與執行皆遵照法令及主管機關規範。

本修正計畫已於民國 ***109*** 年 ***01*** 月 ***03*** 日經本院人體研究倫理審查委員會審核通過，本次核准執行期間至民國 ***109*** 年 ***04*** 月 ***19*** 日，特此證明。

已完成之研究應於**研究執行期間**末日後三個月內繳交結案報告，除維護受試者安全之必要作為外，於**核准期間**末日後應停止執行所有受試者相關之研究程序。

計畫主持人逾**核准期間**末日仍未繳交報告者，列入逾期名單，本會將寄發本研究案之中止/終止通知書。逾期名單將提本會審查會議報告，經會議決議後，本會將暫停受理名單上人員所主持之新案審查申請，迄繳交應繳報告並經本會會議審查通過後，始得受理其新案審查申請。

追蹤/結案報告請以書面繳交；報告書請逕送本院人體研究倫理審查委員會辦公室；報告表格最新版本請至本會網頁(http：// www.ncku.edu.tw/ ~nckuhirb)下載。

研究計畫內容有任何變更或修正(含**研究執行期間**變更)，須於**研究執行期間**內向本會提出申請，本會不受理未在**研究執行期間**內提出之變更或修正案。變更或修正未獲本會核准前，須依原核准範圍執行。

已獲本會同意之研究案，因故未開始執行或不繼續執行者，應申請中止/終止。

不論研究進行中或研究完成後，受試者若發生任何不良反應，須依 GCP 規範通報。

此致

國立成功大學醫學院附設醫院
人體研究倫理審查委員會
主任委員

[redacted]

中　華　民　國　109　年　01　月　03　日

Institutional Review Board
National Cheng Kung University Hospital
138 Sheng-Li Rd, Tainan 704, Taiwan R.O.C.
TEL:886-6-2353535 ext.3635 FAX:886-6-2388190

國立成功大學醫學院附設醫院
第一人體研究倫理審查委員會
台灣.台南市勝利路138號
E-mail:em73635@mail.hosp.ncku.edu.tw

Human Study Amendment Approval

Date: 2020.01.03

Title: Are we PrEPared to provide? A mixed-methods study on the needs of community-based 'Sexually Transmitted Infection Friendly Physicians's in Taiwan to provide pre-exposure prophylaxis (PrEP) services for HIV prevention.

Protocol No/ IRB No: -- / A-ER-108-103

Period of Project: From 2019.04.20 to 2020.12.31

Period of Approval: From 2019.04.20 to 2020.04.19

Content/Version:

1. Protocol: Version: 2, Date: 2019.11.29
2. Informed Consent Form: Version: 2, Date: 2019.10.23
3. Add the number of enrolled to 20 persons
4. Research Term Extends till 2020.12.31

Institute: National Cheng Kung University

Investigator: Associate Prof. Carol Strong (Department of Public College)

Co- Investigator: Prof. Nai-Ying Ko, Yen-Hao Chu

The Institutional Review Board of National Cheng Kung University Hospital (NCKUH) is organized and operated according to the laws and regulations of ICH-GCP and of Central Competent Authorities.

This project is reviewed and approved by NCKUH IRB in 2020.01.03. The period of approval is granted until 2020.04.19.

Regarding completed project, the Final Report shall be submitted within three months of its approved expiry date. Except for the health of the participants, all the procedures of the project shall be terminated on its approved stated deadline.

If PI does not submit the Interim/Final Report on time, he/she will be recorded in the overdue list and received the suspension/ termination notice from NCKUH IRB. The overdue list will be reported to the IRB. After the resolution of the board meeting, NCKUH IRB will suspend all the new projects applied by PI until the Interim/Final Report is submitted.

Please submit the Interim/Final Report in written form and send to NCKUH IRB office. The lastest application forms can be downloaded in its website (http：// www.ncku.edu.tw/ ~nckuhirb)

Any changes or amendments to the project (including the project period), please submit an amendment application to NCKUH IRB within its approved period. Any changes or amendments in any other way will not be accepted. Before the approval of the amendment application, the project is carried out according to its previously approved plan.

For some reasons projects granted approval by NCKUH IRB couldn't be implemented, PI shall apply for suspension/termination.

During or after the project is completed, please report any unfavorable occurrence in a human study particant according to GCP.

Yours sincerely,
Ting-Tsung Chang M.D.
Chairman

Institutional Review Board
National Cheng Kung University Hospital

Appendix 6. **Participant information sheet for cognitive interview (in Traditional Chinese)**

國立成功大學
人體研究說明及同意書

您被邀請參與此研究，本說明及同意書提供您有關本研究之相關資訊，研究主持人將會為您說明研究內容並回答您的任何疑問。

計畫名稱：以混合研究法分析社區診所性病友善醫師提供暴露愛滋病毒前預防性投藥(PrEP) 服務之行為需求

執行單位：國立成功大學公共衛生研究所
委託單位/贊助機構：臺北榮民總醫院暨國立陽明大學
委託單位/贊助機構住址：臺北市北投區立農街二段 155 號 醫學館 3 樓 317 室
贊助者聯絡方式：國立陽明大學醫學系 沈頤欣專案組員(電話：28267000#5107)
研究經費來源：榮陽卓越醫師人才培育計畫
主要主持人：莊佳蓉 職稱：副教授 聯絡電話：06-2353535-5963
共同主持人：柯乃熒 職稱：教授 聯絡電話：06-2353535-5838
共同主持人：朱彥豪 職稱：博士班學生 聯絡電話：06-2353535-5963

一、研究簡介：

愛滋病乃當代重大的公共衛生議題之一。我國政府自 1997 年起提供免費愛滋治療與防治政策，但每年新增病例仍超過兩千例。感染者年齡年輕化，影響全民健康與國家競爭力甚鉅。暴露愛滋病毒前預防性投藥（PrEP）可望終結台灣愛滋疫情。台灣愛滋病學會自 2016 年頒布我國 PrEP 使用指引，建議未感染愛滋之高風險族群（關鍵族群）每日口服一錠 PrEP，可降低 86%之感染風險。衛生福利部疾病管制署（疾管署）同年 11 月推動 PrEP 前驅計畫，然參與人數僅為預估之三成，歸因於醫療人員與使用者之需求未獲滿足。

經疾管署認證於社區執業之友善性病門診醫師（性友善醫師）有三大優點，極具提供 PrEP 服務潛力：經常接觸關鍵族群、熟悉性病診治與實驗室檢查，且社區診所之高可用性，可近性且對患者財力負擔較小。性友善醫師可拓展現行醫療體系之防疫量能，強化我國健康照護系統。然而我國目前缺乏針對該類醫師之相關研究。本研究將以全台 610 位性友善醫師為對象，調查其提供 PrEP 醫療服務之意願與行為需求，提供國家發展亟需之公共衛生政策。

二、研究目的：

本計畫旨在瞭解台灣於診所執業之性病友善醫師對提供 PrEP 服務之行為需求，以期提供政府相關單位以醫師需求為基礎之醫療政策建言。本研究希望邀請於診所執業且經疾管署認證之性病友善醫師，分享您對提供 PrEP 醫療服務給男男性行為者之看法與處方行為需求。

三、研究預計執行期間、研究參與者數目：

執行期間：2019/04/20 – 2020/12/31
研究參與者數目：20 人

四、研究之主要納入與排除條件：

研究目標納入條件為公告於疾管署網站，經疾管署認證之性病友善醫師，且其執業地點為非醫院之醫療場所（例如：診所與衛生所）。

NCKUH IRB
2020.1.03
Approved

五、研究方法、程序及研究參與者應配合事項：

本研究將以一對一進行訪談，地點可選在您方便的地點，例如您執業之診所。時間約為 40 分鐘至一小時，原則上進行一至兩次。為記錄正確的資料，訪談過程會進行錄音。若您不願意接受錄音或不願某段發言被錄音，或中途想停止，請隨時提出。錄音資料彙整為逐字稿後會再請您確認，我們會負起資料保密之責任，未來研究成果不會呈現您的真實姓名與可辨識之個人資料，亦會盡力避免他人從研究發表辨識出您。逐字稿經您確認後，我們將即刻進行匿名去辨識之動作。本研究結果主要用於發展問卷，但在非預期情況下您的身份或仍有可能受到揭露，我們會盡力將對您的影響減至最小，請您慎重考慮是否接受訪談。

六、研究資料之保存期限及運用規劃：

錄音檔與逐字稿將妥善保存在成功大學研究室裡設有密碼的硬碟或電腦裡，且於研究結束 10 年後刪除銷毀，訪談內容只用於本研究之質性分析並做為發展研究問卷之基礎。若您有興趣瞭解研究結果，可提供您報告摘要。本研究並無任何衍生之商業利益。過程中，若您感到不舒服，想要暫停或退出研究，我們會完全尊重您的意願。先前已蒐集的資料將即刻銷毀。然若您提供之資料經匿名編碼後已無法識別並納入分析，我們將無法刪除經匿名後之資料。即便研究結束，若您有任何疑問，都歡迎您與我們聯絡。

七、研究材料之保存與使用

1.研究參與者資料之保存與再利用

您的資料將由研究團隊妥善保存至 2029 年屆滿後即銷毀。所有新的研究計畫都要再經由成大醫院人體研究倫理審查委員會審議通過，倫理審查委員會若認定新的研究超出您同意的範圍，將要求我們重新得到您的同意。

八、可預見之風險及造成損害時之補救措施：

本訪談內容將不涉及針對個人之敏感問題，然若您於訪談過程中認為花費時間過長，或是有身心感到不適之情形，您可要求訪談員立即終止會談，必要時您可隨時退出本研究。

九、研究預期效益：

本研究將於學術、理論、防疫實務與政策制定層面，產生前瞻性與即時性之貢獻。做為亞洲首例針對 PrEP 服務供給者之行為需求研究，透過台灣與英國雙邊學術合作，不僅提升台灣於全球愛滋防治研究之地位，奠定性友善醫師提供 PrEP 服務之基礎，更將提供以科學實證為基礎之衛生政策建言。研究成果有助於提升我國愛滋防治之服務量能，創造我國政府、醫療供給者與 PrEP 使用者之三贏局面。

十、損害補償與保險：

(一) 如依本研究所訂研究計畫，因而發生不良反應或傷害，由國立成功大學負損害補償責任。但本研究參與者同意書上所記載，而無法預防之可預期不良反應，不予補償。

(二)如依本研究進行因而發生不良反應或傷害，國立成功大學願意提供必要協助。

(三)除前二項補償外，本研究不提供其他形式之補償。若您不願意接受這樣的風險，請勿參加研究。

(四)您不會因為簽署本同意書，而喪失在法律上的任何權利。

十一、研究參與者權利及個人資料保護機制，至少需包含下列項目：

(一)參加研究之補助

受訪者無需負擔任何費用。為感謝您寶貴參與，我們將於受訪結束時，致贈您一份禮品。

(二)保護隱私

研究所得資料可能發表於學術雜誌，但不會公佈您的姓名且對研究參與者個人資料之隱私絕對保密，同時計畫主持人將謹慎維護您的隱私權。中央衛生主管機關、研究委託者與成大醫院人體研究倫理審查委員會在不危害您的隱私情況下，依法有權檢視您的資料。

(三) 研究過程中如有新資訊可能影響您繼續參與研究意願的任何重大發現，都將即時提供給您。

(四) 如果你(妳)在研究過程中對研究工作性質產生疑問，對身為患者之權利有意見或懷疑因參與研究而受害時，可與成大醫院之人體研究倫理審查委員會聯絡請求諮詢，其電話號碼為：06-2353535 轉 3635 或 e-mail : em73635@mail.hosp.ncku.edu.tw 或郵寄至 704 台南市北區勝利路 138 號門診大樓人體研究倫理審查委員會。

本同意書一式兩份，主持人/共同主持人研究人員已將同意書副本交給你(妳)，並已完整說明本研究之性質與目的，也已回答您研究等相關問題。

十二、研究可能衍生之商業利益及其應用之約定：

本研究預期不會衍生專利權或其他商業利益。

十三、研究之退出與中止：

您可自由決定是否參加本研究；研究過程中也可隨時撤銷同意，退出研究，不需任何理由，且不會引起任何不愉快。研究主持人或贊助機構可能於必要時中止該研究之進行。

若您決定退出研究，其之前的資料會徵詢您的意願後進行保留分析或銷毀。若資料保留分析，研究團隊同樣會維護您的隱私與個人資料的機密性。

十四、簽名欄：

(一) 研究參與者已詳細瞭解上述研究方法及其所可能產生的危險與利益，有關本研究計畫的疑問，業經計畫主持人詳細予以解釋。本人同意參與此研究。

研究參與者簽名：_____

日期：_____ 年_____月_____日

(二) 主持人已詳細解釋有關本研究計畫中上述研究方法的性質與目的，及可能產生的危險與利益。

主要主持人/共同主持人簽名：_____

日期：_____年_____月_____日

Appendix 7. **The final version of the survey questionnaire (in Traditional Chinese)**

社區診所性健康友善醫師提供暴露愛滋病毒前預防性投藥 （PrEP）服務之需求調查

敬愛的醫師您好：

本研究由榮陽卓越醫師人才培育計畫補助，希望瞭解您對於提供暴露愛滋病毒前預防性投藥（**Pre-Exposure Prophylaxis, PrEP**）服務之行為需求，裨利台灣未來愛滋預防政策。研究對象為經疾病管制署或專科醫學會認證之性健康友善醫師。問卷包含四個部分共**70**題，約花費您**15分**鐘完成填答。

本問卷採不記名之方式作答，填答資料保存至**2030**年**11**月即刪除。研究團隊將盡力維護您的隱私並善盡保密責任。問卷結果將用於學術發表與政策建議，成果發表採用整體分析之方式，不會辨識出你的個人資料，亦無衍生之商業利益。請您自由決定是否填寫，亦可中途不填寫，無須感覺有壓力。惟一旦送交，因問卷採匿名填答形式，研究團隊將無法辨識並刪除您已填答之內容。

此研究預計於**2022**年初完成，若您有興趣得知研究結果與問卷分析細節，歡迎您透過下述聯絡方式索取研究結果摘要。（聯絡人/計畫共同主持人：朱彥豪，電話：**0912-387-409**，電子郵件信箱：**yen-hao.chu1@lshtm.ac.uk**）。本研究已由英國倫敦衛生與熱帶醫學院 （**LSHTM**）委託國立成功大學人類研究倫理審查委員會核准，若您欲諮詢參與研究的權益或申訴，請聯絡該委員會（電話：**06-275-7575＃51020**，電子郵件信箱：**em51020@email.ncku.edu.tw**）。

英國倫敦衛生與熱帶醫學院公共衛生博士候選人　朱彥豪醫師

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英國倫敦衛生與熱帶醫學院公共衛生政策學院　**Dr Ford Hickson**

敬上

2021年**5**月**1**日

* 您是否為疾病管制署或各專科醫學會認證之性健康/性病友善門診醫師？

- ◯ 是
- ◯ 否

* 您目前是否於診所或衛生所執業？

- ◯ 是
- ◯ 否

* 您是否理解上述資訊並同意參與本研究？

- ◯ 同意
- ◯ 不同意

第一部分：您對愛滋暴露前預防性投藥（PrEP）的了解情形

* 1. 請問您是否聽過愛滋暴露**前**預防性投藥（Pre-Exposure Prophylaxis, **PrEP**）？

- ◯ 聽過
- ◯ 沒聽過
- ◯ 我不確定

* 2. 您是否瞭解如何開立愛滋暴露**前**預防性投藥（**PrEP**）？

- ◯ 是
- ◯ 否
- ◯ 我不確定

* 3. 您是否曾經開立愛滋暴露**前**預防性投藥（**PrEP**）給病人/使用者？

- ◯ 是
- ◯ 否

* 4. 承上題，您是透過何種方式提供愛滋暴露**前**預防性投藥（**PrEP**）服務？（可複選）

- ☐ 疾病管制署公費PrEP計劃
- ☐ 使用者支持計劃 （PAP）
- ☐ 全自費PrEP（原廠藥）
- ☐ 全自費PrEP（學名藥）

* 5. 下列是三個關於PrEP的**正確**敘述。請問您**填寫本問卷之前**，對下列敘述的了解情形為何？

	我已經知道這件事	我不太確定這件事是否正確	我從來不知道有這件事情	我不相信這個敘述是正確的	我無法理解這個敘述
A. PrEP是讓未曾感染愛滋病毒的人，透過在性行為前與後服藥的方式來預防愛滋感染。	◯	◯	◯	◯	◯
B. 若使用者無法事先計畫何時發生性行為，她/他可以透過每日服用一顆PrEP的方式來預防愛滋感染。	◯	◯	◯	◯	◯
C. 若男男性行為者能事先計畫性行為時機，他可以在性行為前2至24小時吃兩顆PrEP；性行為發生後，於第一次服藥時間點之24小時後與48小時後各服用一顆PrEP來預防愛滋感染。	◯	◯	◯	◯	◯

第二部分：您對PrEP的看法

* 6. 我具備提供PrEP服務的醫療技能（例如：進行愛滋病毒篩檢、評估使用者的感染風險、說明藥物使用方式與副作用）。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 7. 我有能力說服診所裡的其他醫療同仁，依醫囑執行愛滋病毒抽血採檢。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 8. 如果我要提供PrEP服務，我需要針對診所醫師設計的標準流程。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 9. 如果我要提供PrEP服務，我需要其他醫療同仁（例如：護理師）幫我追蹤使用者的服藥遵從性。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 10. 如果我沒有經常提供PrEP服務，我會忘記如何開立PrEP。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 11. 與其他醫療服務相比，我需要集中更多注意力來提供PrEP。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 12. PrEP服務的藥物儲備與進貨成本，對我的診所營運是個挑戰。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 13. 我認為PrEP在台灣的藥物市場很小（有需求的使用者數量很少）。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 14. 我執業縣市的衛生單位有幫助我提供性健康醫療服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 15. 大多數PrEP使用者/病人無法負擔自費購買PrEP的費用。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 16. 若我知道其他診所醫師開立PrEP，我會更願意提供PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 17. 我只會在使用者/病人主動詢問PrEP時，提供PrEP相關的資訊。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 18. 缺乏互信的醫病關係，使我對於提供PrEP服務感到猶豫。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 19. 許多跟我一樣的性健康友善醫師願意詢問病人的性接觸史。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 20. 提供男男性行為者PrEP來預防愛滋，是符合我醫師專業的行為。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 21. 我認為PrEP使用者必須維持單一性伴侶關係。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 22. 我確保我的病人知道所有能預防愛滋病感染的方法，包含PrEP。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 23. 提供PrEP服務是性病友善醫師很重要的職責之一。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 24. 如果我想要，我有信心能提供PrEP服務給男男性行為者。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 25. 如果我想要，我有信心能提供PrEP服務給不是男男性行為的病人。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 26. 就平常的看診情形而言，我目前有時間提供更多的PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 27. 我有自信能經營那些需要定期回診的PrEP使用者/病人。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 28. 有了PrEP，我對於台灣在2030年之前終結愛滋病疫情感到樂觀。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 29. 我認為常常進行危險性行為的人，願意持續使用PrEP預防愛滋。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 30. 如果有更多人服用PrEP，台灣愛滋新增感染人數會下降。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 31. PrEP對台灣的公共衛生有益處。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 32. 提供PrEP服務，會讓我被民眾認為是專門診治愛滋病的醫師。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 33. 若被民眾認為是專門診治愛滋病的醫師，我的門診病人數目會變少。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 34. 我認為PrEP會增加使用者的性伴侶數目。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 35. 我認為PrEP會增加其他性傳染病（例如：梅毒、淋病）的傳播。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 36. 我認為PrEP會增加使用者進行無套性行為的次數。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 37. 提供PrEP服務會讓我花更多時間在醫療核銷與文書作業。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 38. 如果每個月要處理PrEP服務相關的文書作業，我會感到煩躁。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 39. 當我診斷病人感染愛滋病毒時，我會感到難過。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 40. 和病人討論如何用PrEP預防愛滋，會讓我感到尷尬不自在。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 41. 我想要知道其他醫師如何提供PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 42. 未來半年內，我有打算開始（或繼續）提供PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 43. 我想要促進男男性行為族群的性健康。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 44. 我有明確的計畫，要在未來半年內提供男男性行為族群PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 45. 我的行醫目標是推廣每一次性交時全程使用保險套。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 46. 我想要看到愛滋病疫情在台灣終結。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 47. 如果政府有提供適當的財務補貼，我願意提供PrEP服務。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 48. PrEP的獲利程度，是我決定提供該服務與否的主要考量。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 49. 如果提供PrEP服務能成功預防病人感染愛滋，我的心裡會有成就感。

非常同意 同意 不反對也不同意 不同意 非常不同意

* 50. 提供PrEP服務將增加造訪我診所的人數。

非常同意 同意 不反對也不同意 不同意 非常不同意

第三部分：您對台灣未來PrEP計畫的建言

* 51. 您認為哪些機構適合提供PrEP服務？（可複選）

- [ ] 醫院
- [ ] 診所
- [ ] 衛生所
- [ ] 藥局(需醫師處方籤)
- [ ] 藥局(不需醫師處方籤)
- [ ] 我認為PrEP服務不應該被提供

* 52. 您認為哪些醫師適合提供PrEP服務？（可複選）

- [ ] 感染科專科醫師
- [ ] 非感染科專科醫師
- [ ] 任何受過PrEP教育訓練的醫師
- [ ] 任何醫師，不論是否受過PrEP教育訓練
- [ ] 我認為PrEP服務不應該被提供

若您未來被建議提供PrEP服務，您可能有下列各項需求。您認為哪些單位可以協助您？

* 53. 增加我對於PrEP的知識 (可複選)

- [ ] 我不需要協助
- [ ] 疾病管制署
- [ ] 縣市衛生局
- [ ] 其他，請說明：
- [ ] 專科醫學會
- [ ] 性健康相關協會/團體

* 54. 增進我提供PrEP服務的臨床技術（例如：進行愛滋病毒篩檢、評估使用者的感染風險、說明藥物使用方式與副作用）(可複選)

- [ ] 我不需要協助
- [ ] 疾病管制署
- [ ] 縣市衛生局
- [ ] 其他，請說明：
- [ ] 專科醫學會
- [ ] 性健康相關民間團體

* 55. 幫助我記得如何提供PrEP服務 (可複選)

- [ ] 我不需要協助
- [ ] 疾病管制署
- [ ] 縣市衛生局
- [ ] 其他，請說明：
- [ ] 專科醫學會
- [ ] 性健康相關民間團體

* 56. 提供我易讀且方便諮詢的PrEP服務指引 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 57. 降低PrEP費用到我的病人/使用者能負擔的金額 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 58. 鼓勵更多潛在使用者來我的診所詢問PrEP (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關協會/團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 59. 強化我身為PrEP服務醫師的專業認同 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 60. 增強我對提供PrEP服務的自信心 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 61. 對PrEP在台灣的前景感到樂觀 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 62. 簡化PrEP服務的核銷流程與文書作業 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 63. 確保我的病人/使用者知道所有預防愛滋的方法 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 64. 鼓勵我把PrEP服務設定為執業目標之一 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

* 65. 獲得針對PrEP服務的財務補貼 (可複選)

- [ ] 我不需要協助
- [ ] 專科醫學會
- [ ] 疾病管制署
- [ ] 性健康相關民間團體
- [ ] 縣市衛生局
- [ ] 其他，請說明：

最後部分：個人基本資料

* 66. 您目前執業登記的**專科別**為？(按筆劃順序排列)

- [ ] 大腸直腸外科
- [ ] 皮膚科
- [ ] 泌尿科
- [ ] 家庭醫學科
- [ ] 婦產科
- [ ] 感染科
- [ ] 精神科
- [ ] 職業醫學科
- [ ] 內科專科 (非感染科)
- [ ] 其他外科專科
- [ ] 具醫師執照但無專科

* 67. 您目前執業登記的**醫療機構**為？

- [ ] 診所
- [ ] 衛生所
- [ ] 地區醫院
- [ ] 區域醫院
- [ ] 醫學中心
- [ ] 以上皆非

* 68. 您目前執業的**地區**為？

- ◯ 北部 (北北基桃竹宜)
- ◯ 中部 (苗中彰投雲)
- ◯ 南部 (嘉南高屏)
- ◯ 東部 (花東)
- ◯ 離島（澎金馬）

* 69. 您的性別為？

- ◯ 男性
- ◯ 女性
- ◯ 非二元性別

70. 若您有其他建議想與我們分享，請寫下您的寶貴建言：

感謝頁面

研究團隊非常感謝您的寶貴參與。此研究預計於 2022年初完成，若您有興趣得知研究結果與問卷分析細節，歡迎您透過下述聯絡方式索取研究結果摘要。（聯絡人：朱彥豪醫師，電子信箱： yen-hao.chu1@lshtm.ac.uk）。若您想了解關於PrEP服務提供之資訊，請參閱疾管署網站：https://www.cdc.gov.tw/Category/MPage/tXBKgpeVZ9l9929TEdZGJw

離開頁面1 - 針對問卷說明頁「您是否為疾病管制署或各專科醫學會認證之性健康/性病友善門診醫師」，點選「否」者：

很抱歉，這份問卷研究對象為 社區診所執業之性健康/性傳染病友善門診醫師。研究結果預計於 2022年初發表，若您有興趣了解更多關於我國PrEP愛滋防治之訊息，請見請參閱衛生福利部疾病管制署網站：
https://www.cdc.gov.tw/Category/MPage/tXBKgpeVZ9l9929TEdZGJw

離開頁面2 - 針對「您是否理解上述資訊並同意參與本研究？」問題，點選「不同意」者：

我們了解您的顧慮，本問卷採完全匿名形式且僅需10分鐘完成填答。您的參與對我們來說非常重要，更有助於台灣未來愛滋政策發展。歡迎您於2021年7月31日前隨時點選 https://zh.surveymonkey.com/r/VP7BTKJ重新參加本研究，感謝您。

Appendix 8. **The English version of the survey questionnaire**

Measuring the needs of Community-based Sexually-Transmitted-Infection-Friendly-Physicians for HIV pre-exposure prophylaxis (PrEP) service provision

Dear physicians,

You are invited to participate in a study on what physicians require to provide Pre-Exposure Prophylaxis (PrEP) services for HIV prevention in Taiwan. This study will be conducted by researchers from London School of Hygiene & Tropical Medicine (LSHTM, UK) and National Cheng-Kung University (NCKU, Taiwan). It is important for you to understand why your contribution to this study is necessary and what it will involve. Please take time to read the following information carefully.

Background of this survey

Medical providers play key roles in healthcare innovations, including HIV PrEP. Understanding the needs of physicians, especially those who practise outside hospitals as community-based sexually-transmitted infection friendly physicians (CSTIPs), will be pivotal for the Taiwanese government to planning nationwide PrEP service delivery in the future. This study aims to provide policy recommendations for Taiwan CDC to maximise physicians' contributions to nationwide PrEP implementation. This 15-minute questionnaire comprises 70 items: understanding of PrEP, needs for PrEP service delivery, recommendations on future PrEP services and demographics. **Your contribution is crucial for Taiwan to have better PrEP policies** addressing both users and providers' needs.

Your participation in this survey

Participation is entirely voluntary. You can withdraw from the study at any time without giving a reason by informing the researcher, and all your collected data will be discarded. Your confidentiality will be strictly maintained, and we will not connect your responses to your personal information. No names or practice information will used in any presentation or document from the study. Any data you provide will be stored in an encrypted drive secured by LSHTM and NCKU. All data will be destroyed ten years after the study completion. For questions or more information on this study, please do not hesitate to contact Dr Isaac Yen-Hao Chu at Yen-hao.chu1@lshtm.ac.uk. Please contact Medical Ethics Committee at National Cheng Kung University Hospital (TEL：06-275-7575＃51020; E-mail: em51020@email.ncku.edu.tw) if you have any ethical concern.

Sincerely yours,

Dr Isaac Yen-Hao Chu (London School of Hygiene & Tropical Medicine)

Dr Carol Strong (National Cheng-Kung University)

Professor Nai-Ying Ko (National Cheng-Kung University)

Dr Ford Hickson (London School of Hygiene & Tropical Medicine)

*Have you been certificated as a sexually-transmitted-infection friendly physician by Taiwan CDC or medical associations in Taiwan?

☐Yes ☐No

*Are you currently practising at clinics or public health centre?

☐Yes ☐No

*Have you read the above information and agreed to proceed to the survey?

☐Yes ☐No

Section One. Your understanding of HIV Pre-exposure Prophylaxis (PrEP)

1 Have you heard of PrEP (**Pre**-Exposure Prophylaxis)?

- ☐ Yes
- ☐ No
- ☐ Not sure

2 Do you know how to prescribe PrEP?

- ☐ Yes
- ☐ No
- ☐ Not sure

3 Have you ever prescribed PrEP to patients/users?

- ☐ Yes
- ☐ No

4 Following Question 3, what model(s) have you prescribed PrEP within? (**TICK ALL THAT APPLY**)

- ☐ Taiwan CDC PrEP programme
- ☐ Patient Assistance Programme (PAP)
- ☐ Self-paid patented PrEP
- ☐ Self-paid generic PrEP

5 The following are three **true** statements about PrEP. **Before you fill out this questionnaire** to what extent did you know these statements?

A Pre-exposure prophylaxis (PrEP) involves someone who does not have HIV taking pills before and after sex to prevent them getting HIV.

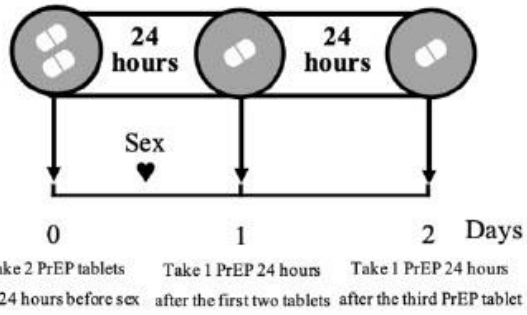
- ☐ I knew this already
- ☐ I was not sure about this
- ☐ I have never known this
- ☐ I do not believe that this statement is true
- ☐ I do not understand this statement

B If users do not know in advance when they will have sex, she/he can prevent HIV infection by taking one PrEP pill daily.

- ☐ I knew this already
- ☐ I was not sure about this
- ☐ I have never known this
- ☐ I do not believe that this statement is true
- ☐ I do not understand this statement

C If men-who-have-sex-with-men know in advance when they will have sex, PrEP needs to be taken as a double dose between 2 and 24 hours before sex and then one pill at both 24 and 48 hours after the double dose.

- ☐ I knew this already
- ☐ I was not sure about this
- ☐ I have never known this
- ☐ I do not believe that this statement is true
- ☐ I do not understand this statement



Section Two: Needs for PrEP service provision

To what extent do you agree with the following statements about PrEP services?

		Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
6	I have clinical skills to provide PrEP services (e.g., perform HIV testing, assess users' risks of HIV infection and explain indications and side effects of PrEP).					
7	I have the ability to persuade colleagues in my clinic to take blood samples for HIV testing.					
8	If I am to provide PrEP, I need a standard operating procedure tailored to physicians working at clinics.					
9	If I am to provide PrEP, I need other healthcare professionals (e.g. nurses) to follow up users' adherence to medicine.					
10	I will forget how to provide a service if I do not practice it often.					
11	PrEP requires more attention than other medical services.					
12	The cost of drug stocking and procurement management for PrEP will challenge the operations of my clinic.					
13	I think there is little market for PrEP service in Taiwan (the number of users in need are few).					
14	The public health bureau in my county/city helps me to deliver sexual health services.					
15	Most PrEP users/patients cannot afford PrEP if paying out-of-pocket.					
16	If I know other physicians at clinics are prescribing PrEP, I am more willing to provide PrEP services.					

		Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
17	I will provide PrEP services only if users/patients actively ask for PrEP.					
18	The lack of trust in patient-physician relationships makes me hesitant about providing PrEP services.					
19	Many physicians like me are willing to ask patients about their sexual history.					
20	Providing men-who-have-sex-with-men with PrEP is a practice that is consistent with my profession.					
21	I think that PrEP users should maintain a monogamous relationship despite taking PrEP.					
22	I ensure my patients know all the methods of HIV prevention, including PrEP.					
23	Providing PrEP services is one of the responsibilities of CSTIPs.					
24	I am confident that, if I wanted, I could provide PrEP services to men-who-have-sex-with-men (MSM).					
25	I am confident that, if I wanted, I could provide PrEP services to patients who are not MSM.					
26	I currently have time to provide more PrEP services in my daily practice.					
27	I feel confident in managing PrEP users/patients who require regular follow-ups.					
28	With PrEP services, I am optimistic about ending AIDS by 2030 in Taiwan.					
29	I think that people who often have risky sex are willing to take PrEP for preventing HIV.					

		Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
30	The number of new HIV infections will be reduced if more people take PrEP.					
31	PrEP will benefit public health in Taiwan.					
32	Providing PrEP will make the public consider me as a HIV specialist.					
33	If I am considered as an HIV specialist by the public, the number of patients in my clinic will decrease.					
34	I think PrEP will increase users' number of sexual partners.					
35	I think PrEP will increase the transmission of other sexually transmitted infections (e.g. syphilis and gonorrhoea).					
36	I think PrEP will increase users' frequency of condomless sex.					
37	Providing PrEP service will take me more time in medical claims and paperwork.					
38	Monthly paperwork derived from PrEP services will annoy me.					
39	I feel sad when diagnosing patients with HIV.					
40	Discussing PrEP for HIV prevention with patients makes me feel embarrassed.					
41	I want to know how other physicians provide PrEP services.					
42	I intend to provide PrEP services in the next six months.					
43	I want to improve the sexual health of men-who-have-sex-with-men.					

		Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
44	I have a concrete plan of providing PrEP services to men-who-have-sex-with-men in the next six months.					
45	My goal is to promote condom use with every act of sexual intercourse.					
46	I want to see the end of AIDS in Taiwan.					
47	If governments offer adequate financial reimbursement, I am willing to deliver PrEP services.					
48	The profitability of PrEP is primary in my decision to deliver it or not.					
49	I will feel a sense of accomplishment if PrEP service provision can successfully prevent patients from contracting HIV.					
50	Delivering PrEP services will increase the number of visits at my clinic.					

Section Three: Recommendations on future PrEP services in Taiwan

51 Which do you think are appropriate facilities for PrEP service delivery? **(TICK ALL THAT APPLY)**

- ☐ Hospital
- ☐ Clinic
- ☐ Public Health Centre
- ☐ Pharmacy (with prescriptions)
- ☐ Pharmacy (without prescriptions)
- ☐ I do not think PrEP should be provided

52 Who do you think are appropriate physicians for PrEP service delivery? **(TICK ALL THAT APPLY)**

- ☐ Infectious disease specialist
- ☐ Non-infectious disease specialist
- ☐ Any physician who finished PrEP education training
- ☐ Any physician regardless of PrEP education training
- ☐ I do not think PrEP should be provided

If you are asked to deliver PrEP services in the future, you may have the following needs. Who, in your opinion, will be the most appropriate in satisfying your needs?
(TICK ALL THAT APPLY)

53 Improve my knowledge about PrEP

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

54 Increase my skills at providing PrEP (e.g. perform HIV testing, assess users' risks of HIV infection and explain the indication and side effects of PrEP)

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

55 Help me to remember how to deliver PrEP services

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

56	Provide me with easy read instructions PrEP service delivery	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):
57	Reduce the cost of PrEP to the amount that my users/patients can afford	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):
58	Encourage more potential users to ask for PrEP at my clinic	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):
59	Strengthen my professional identity as a PrEP service provider	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):
60	Boost my confidence in PrEP service provision	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):
61	Be optimistic about the future of PrEP in Taiwan	☐ I do not need help ☐ Taiwan CDC ☐ Local public health bureau ☐ Medical specialist societies ☐ Local sexual health organisations ☐ Others (please specify):

62 Simplify the process of and paperwork for PrEP service

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

63 Ensure my users/patients know all the measures of HIV prevention

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

64 Set PrEP service as one of my practice goals

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

65 Get financial reimbursement with regard to PrEP services

- ☐ I do not need help
- ☐ Taiwan CDC
- ☐ Local public health bureau
- ☐ Medical specialist societies
- ☐ Local sexual health organisations
- ☐ Others (please specify):

Section Four. Demographics

66 In which of the following specialties are you currently registered for practice? (options listed alphabetically)

- ☐ Colorectal surgery
- ☐ Dermatology
- ☐ Family medicine
- ☐ Infectious disease (ID)
- ☐ Internal medicine, non-ID
- ☐ Obstetrics and gynaecology
- ☐ Occupational medicine
- ☐ Paediatrics
- ☐ Psychiatry
- ☐ Urology
- ☐ Other surgical specialties
- ☐ Non-specialist

67 What type of medical facilities are you currently registered for practice?

- ☐ Clinic
- ☐ Public health centre
- ☐ District hospital
- ☐ Regional hospital
- ☐ Medical centre
- ☐ None of the above

68 Which region you are currently practising in?

- ☐ Northern Taiwan
- ☐ Central Taiwan
- ☐ Southern Taiwan
- ☐ Eastern Taiwan
- ☐ Outer islands

69 What is your gender?

- ☐ Man
- ☐ Woman
- ☐ Non-binary

70 Is there anything you would like to add about HIV, PrEP or this study?

<End of the questionnaire. We appreciate your kind responses and patience.>