

นิพนธ์ต้นฉบับ

การทบทวนวรรณกรรมแบบกำหนดขอบเขตงานวิจัยเกี่ยวกับโรคไม่ติดต่อเรื้อรังที่จัดทำโดยแพทย์เวชศาสตร์ครอบครัวไทยในช่วงสองทศวรรษ (2543-2566)

จตุพร เชียงแรง, พบ., วว.เวชศาสตร์ครอบครัว¹, วัลลิกา รัตนจันทร์, พบ., วว.เวชศาสตร์ครอบครัว¹, โรจนคั้กดี ทองคำเจริญ พบ., วว.เวชศาสตร์ครอบครัว², สุพัตรา ศรีวณิชชากร, พบ., วว.เวชศาสตร์ป้องกัน (ระบาดวิทยา), อว.เวชศาสตร์ครอบครัว³

¹โรงพยาบาลน่าน จังหวัดน่าน, ²กลุ่มงานเวชกรรมสังคม โรงพยาบาลแม่สอด จังหวัดตาก, ³ราชวิทยาลัยแพทย์เวชศาสตร์ครอบครัวแห่งประเทศไทย กรุงเทพมหานคร

ผู้รับผิดชอบบทความ:

จตุพร เชียงแรง, พบ.,
กลุ่มงานเวชกรรมสังคม
โรงพยาบาลน่าน อ.เมือง จ.น่าน
55000, ประเทศไทย
Email: j.rerksomphus27@
hotmail.com

Received: July 22, 2024;

Revised: July 30, 2024;

Accepted: August 21, 2024

บทคัดย่อ

ที่มา: โรคไม่ติดต่อเรื้อรังเป็นสาเหตุของการ死ทั่วโลก ราชวิทยาลัยแพทย์เวชศาสตร์ครอบครัวแห่งประเทศไทยบรรจุ “การดูแลผู้ป่วยโรคเรื้อรัง” ในหลักสูตรแพทย์ประจำบ้านเวชศาสตร์ครอบครัว การศึกษานี้มีวัตถุประสงค์เพื่อทบทวนงานวิจัยการดูแลผู้ป่วยโรคไม่ติดต่อเรื้อรังที่ได้พิมพ์โดยแพทย์เวชศาสตร์ครอบครัวไทย

แบบการวิจัย: การทบทวนวรรณกรรมแบบกำหนดขอบเขต

วัสดุและวิธีการ: ดำเนินการค้นหานานวิจัยจากแพทย์เวชศาสตร์ครอบครัวที่ลงทะเบียนในฐานข้อมูล “Famscholar” ซึ่งพัฒนาโดยภาควิชาเวชศาสตร์ครอบครัว มหาวิทยาลัยเชียงใหม่ ซึ่งรวมงานวิจัยจาก Scopus และ Thai Journal Online (ThaiJO) ระหว่างปี พ.ศ. 2548-2566 ศึกษาบทความทั้งภาษาไทยและภาษาอังกฤษ บทความที่เข้าเกณฑ์จำแนกเป็นการดูแลผู้ป่วยและการส่งเสริมสุขภาพ การป้องกันและควบคุมโรคไม่ติดต่อเรื้อรัง

ผลการศึกษา: พบงานวิจัยที่เกี่ยวข้อง 523 ฉบับ เข้าเกณฑ์ทบทวนทั้งสิ้น 74 ฉบับ ในจำนวนนี้ 39 ฉบับ (ร้อยละ 53) และ 35 ฉบับ (ร้อยละ 47) ที่พิมพ์จาก Scopus และ ThaiJO ตามลำดับ วิจัยส่วนใหญ่ (ร้อยละ 46) เป็นการศึกษาแบบภาคตัดขวาง มีสัดส่วนงานวิจัยเกี่ยวข้องกับโรคเบาหวานและภาวะก่อนเบาหวานเป็นหลัก คิดเป็นร้อยละ 64 งาน วิจัยร้อยละ 51 ดำเนินการในโรงพยาบาล ส่องในสาม (ร้อยละ 66) ศึกษาการจัดการโรคเบาหวาน เน้นปัจจัยที่เกี่ยวข้องกับการควบคุมโรค พฤติกรรมสุขภาพ การใช้ยา และการมีส่วนร่วมของครอบครัว

สรุป: งานวิจัยส่วนใหญ่ศึกษาเกี่ยวกับปัจจัยเสี่ยงการควบคุมโรคและการดูแลโรคไม่ติดต่อเรื้อรังในระยะช่วงเวลาหนึ่ง ยังขาดงานวิจัยที่แสดงความครอบคลุมและการดูแลอย่างต่อเนื่องระยะยาว

คำสำคัญ: โรคไม่ติดต่อเรื้อรัง เบาหวาน ความดันโลหิตสูง ระบบการเผาผลาญ เวชศาสตร์ครอบครัว ประเทศไทย

ORIGINAL ARTICLE

A Scoping Review of the Non-Communicable Diseases (NCDs) Research Conducted By Family Physicians During The Two Decades of the Thai Family Physician (2000-2023)

Jatuporn Chiangrang, MD., Diploma, Thai Board of Family Medicine¹, Valika Rattanachan, MD., Diploma, Thai Board of Family Medicine¹, Rojanasak Thongkhamcharoen, MD., Diploma, Thai Board of Family Medicine², Supattra Srivanichakorn, MD., MPH., Cert. Board (Epidemiology), Dip. Thai Board of Family Medicine, FRCFPT³

¹*Nan Hospital, Nan*, ²*Maesot Hospital, Tak*, ³*The Royal College of Family Physicians of Thailand, Bangkok, Thailand*

Corresponding author :

Jatuporn Chiangrang, MD.,
Social Medicine, Nan Hospital,
Muang, Nan 55000, Thailand
Email: j.rerksomphu27@
hotmail.com

Received: July 22, 2024;

Revised: July 30, 2024;

Accepted: August 21, 2024

ABSTRACT

Background: Non-communicable diseases (NCDs) are the dominant contributors to the global burden of disease. The Royal College of Family Physicians of Thailand incorporates 'Care for Patients with Chronic Disease' into the family medicine residency program. This study aims to examine the evidence of the research on NCDs conducted by Thai Family Physicians.

Design: A Scoping Review.

Methods: The list of diploma members of the Thai Family Physicians was registered in a 'Famscholar', database developed by the Department of Family Medicine, Chiang Mai University, which retrieves all publications from Scopus and Thai Journals Online (ThaiJO) between 2005-2023. Original articles, systematic reviews, and meta-analyses published in Thai and English-language peer-reviewed journals were included. The eligible articles were divided into health promotion and NCD prevention and control, and patient management.

Results: Of 523 retrieved, eligible 74 articles were included in this review. Of these, 39 articles (53%) and 35 articles (47%) were retrieved from Scopus and ThaiJO, respectively. Most articles (46%) were cross-sectional studies. Diabetes Mellitus (DM) and pre-DM accounted for 64% of the main findings of NCDs in this study. Fifty-one percent were conducted in a hospital setting. Two-thirds (66%) work in NCD management. The majority of the studies focused on factors related to uncontrolled NCD, good behavior, medication compliance, and family participation.

Conclusions: Most articles explored the risk factors and short-term interventions and management of NCD. Lack of application of comprehensive care of NCDs and continuous care were identified.

Keywords: NCDs, diabetes, hypertension, metabolic, family medicine, Thailand

Introduction

Non-communicable diseases (NCDs) are the result of multiple factors including genetic, physiological, environmental, and behavioral factors. The increasingly important global burden of NCDs causes a substantial healthcare system worldwide. The World Health Organization (WHO) recognizes NCDs as a global health priority and a significant negative impact on public health as well as socioeconomic development. NCDs are responsible for nearly one-third of deaths globally, with 86% of these deaths occurring in low- and middle-income countries. The WHO has been proactively working through various initiatives, policies, and global collaborations to reduce the global burden of NCDs and improve overall health outcomes.¹ The main types of NCDs are cardiovascular diseases (CVDs), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes. Thailand encounters a significant epidemiological transition from communicable diseases to a higher prevalence of NCDs due to lifestyle changes, urbanization, and an aging population. CVDs are a substantial portion leading cause of death in Thailand.² Diabetes Mellitus (DM) and hypertension (HT) are the two highest prevalence in Thailand. HT, high cholesterol, and smoking are the key risk factors contributing to the increased prevalence of CVDs. Diabetes is on the rise, with Thailand having one of the highest rates of DM in the Asia-Pacific region. Sedentary lifestyles, unhealthy diets, and genetic predisposition contribute to the growing prevalence of DM.³

WONCA (the World Organization of Family Doctors) in coordination with the WHO unveiled a WONCA Statement on NCDs and Primary Health Care (PHC) at the 2023 World Council Meeting. The aims are to reduce mortality, disability, and health inequity at a lower per capita cost through Primary Health Care (PHC). Two main strategies are 1) Health promotion and prevention together including improvement of health literacy with patient self-care, expanding local social determinants of health, and developing referral services through community support, and 2) Disease management including working with a multidisciplinary healthcare team based on patient-centered decision making and developing telemedicine. The continuity of care with a family physician, and multidisciplinary team approach, appropriate

local service delivery system that meets the local needs with collective leadership and appropriate health resource support are the main strategies.⁴

The Royal College of Family Physicians of Thailand (RCFPT) was established in 1999. 'Care for patients with chronic disease' has been included in one of seven Entrustable Performance Activities (EPA) of residency training in family medicine in Thailand since 2019.^{5,6}

Although Thailand has a strong PHC playing a role in NCD prevention and control. Adequate human and financial resources are needed to optimize NCD care in PHC.⁷ The role of Family Physicians in Thailand has rarely been mentioned. Therefore, the RCFPT developed the scoping review of the non-communicable diseases (NCDs) research conducted by Family Physicians during the two decades of the Thai Family Physician (2000-2023). The purpose of the project is to systematically evaluate the evidence of the research on NCDs conducted by Thai Family Physicians. This article is one of nine scoping review series. This scoping review only focuses on Diabetes and CVD not including chronic pulmonary disease and cancer. The purpose of the study is 1) to examine the evidence of the NCDs in Thailand published by Thai Family Physicians and 2) to categorize these articles on the spectrum of NCD prevention and control (into disease management versus health promotion and NCD prevention and control).

Methods

Study design

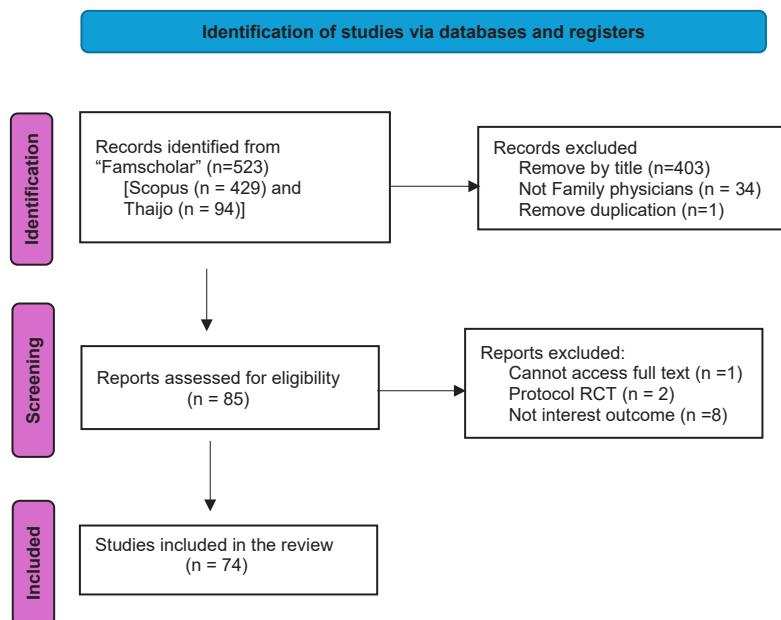
The authors conducted a scoping review to identify relevant non-communicable disease studies.

Search strategies and information sources

A total of 1,565 members enrolled in the Thai Board of Family Medicine's Diploma program have been recorded in the 'Famscholar' database. This platform, created by the Department of Family Medicine at Chiang Mai University, serves as an online academic research database.⁸ The online database was carried out using Famscholar in November 2023. There were 4,486 retrieved from all publications by registered Thai Family Physicians from both Scopus and ThaiJo databases. The Python program was utilized to search and gather research with search terms detailed in Table 1.

Table 1. Search terms used in a scoping review by using article headings

Categories	Keywords
NCDs	DM, diabetes, T1D, T2D, HT, hypertension, CKD, DLP, dyslipidemia, NCD, chronic, stroke, metabolic, obesity, early diagnosis, early treatment, multimorbidity, remission, CVD risk, prevention

**Figure 1.** PRISMA flow diagram of the study selection

Following a comprehensive search of the Medical Council of Thailand database, researchers possessing qualifications beyond the field of Family Medicine were evaluated for eligibility based on their current practice setting and/or professional role.

Study selection

Two researchers (J.C., V.R.) independently screened the studies based on titles and abstracts. If the decision could not be made, full articles were retrieved. Disagreements in the screening process were resolved through discussions and consultations with a third researcher (R.T.).

Inclusion criteria

Original articles, integrative reviews, systematic reviews, and meta-analyses published in Thai and English-language peer-reviewed journals were included.

Exclusion criteria

Narrative reviews, case reports, Letters to the editors, editorials, congress or conference abstracts, interviews, newspaper articles, Book chapters, expert opinions, comments, and unavailable full-text articles were excluded.

Results

We retrieved 523 studies from Famscholar. There were 429 and 94 studies from Scopus and ThaiJo databases respectively. Of these 403 articles were eliminated from the study because their titles did not align with the research focus. Thirty-four articles were not conducted by Thai family physicians considering all authors of the article. One duplicate article was excluded. Eighty-five articles were sought for retrieval. According to the inclusion and exclusion criteria, 11 articles were excluded and 74 studies were reviewed, see figure 1.

Forty articles, thirty articles, and four articles were published from 2011-2020, 2021-2023, and 2001-2010, respectively (Fig. 2). Of these, 39 articles were in Scopus, and 35 articles were in ThaJo. The majority of the articles, 34 articles (46%), were cross-sectional studies. A qualitative studies and case-control studies, there was only 1 study in each method. Two articles were RCT. None articles were mix-method (Table 2).

The majority of research studies about diabetes accounted for 57%, followed by studies about NCDs and metabolic syndrome in the same proportion (12%) and hypertension (11%),

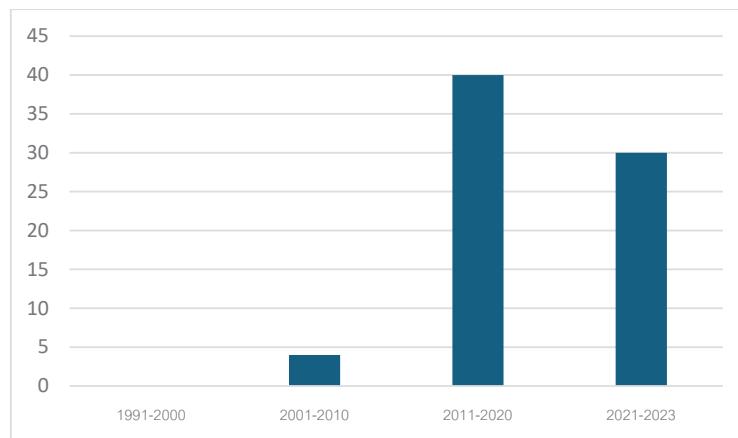


Figure 2. Number of articles by year of publication related to NCDs

Table 2. Article methods

Methods	Scopus N = 39 (53%)	Thaiijo N = 35 (47%)	Total N = 74 (100%)
Observational			
Qualitative study	1	-	1 (1.4)
Cross-sectional study	18	16	34 (46)
Case-control study	-	1	1 (1.4)
Cohort study	6	3	9 (12)
Experimental			
Clinical trial (RCT)	1	1	2 (2.7)
Clinical trial (non-RCT)	3	7	10 (13.5)
Mixed method study	-	-	-
Systematic review			
Meta-analysis	2	1	3 (4.0)
Others	8	6	14 (19)

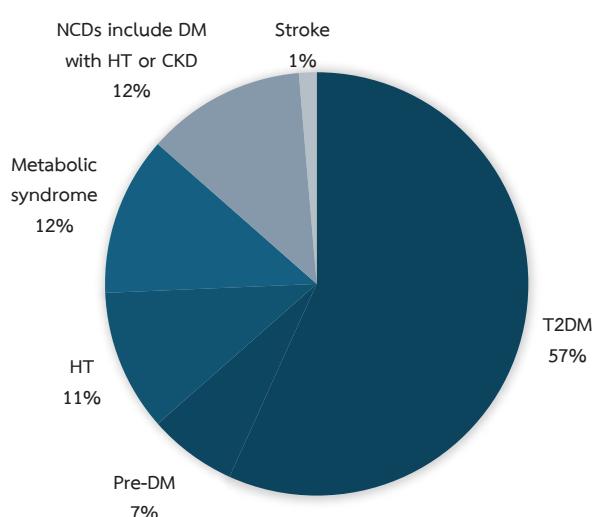


Figure 3. Number of articles by category

respectively. Pre-DM was 7% and only 1% related to stroke (Fig. 3). After being divided into two dimensions, most articles (66%) were related to disease management, followed by health promotion and prevention (34%) (Figure 4). Thirty-eight

articles (51%) were collected from the hospital, and twenty-five articles (34%) were collected from communities, retrospectively (Fig. 5).

Discussion

This scoping review showed that the NCD research conducted and published by Family Physicians in the past two decades had three characteristics. Firstly, half of the published articles were cross-sectional studies showing the present situation but not showing the long-term outcomes of chronic diseases or risk reduction as a cohort study might be preferred. Three possible reasons were the research conducted by Family Medicine residents with a three-year time limit course, short-term NCD key performance indicators (KPIs) submitted to the Ministry of Public Health, and the potential lack of funding for such research. Secondly, half of the articles were hospital-based studies and only one-third of the studies were collected from a community care

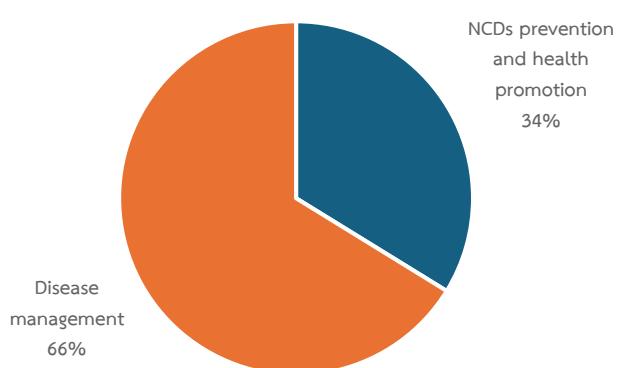


Figure 4. Number of articles by domains

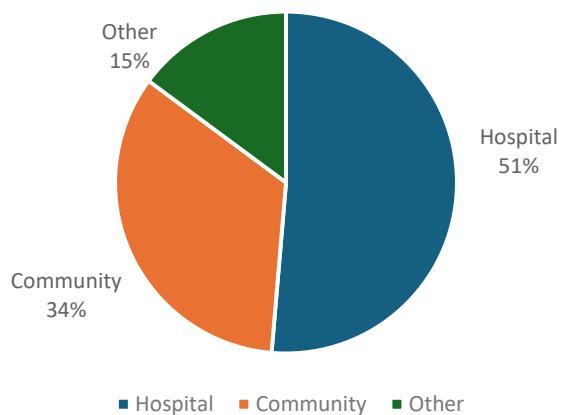


Figure 5. Number of articles by research setting

setting showing that most Family Physicians still work in hospitals and programs working in communities may not be published as the research. Finally, nearly 70% percent of Thai Family Physicians focus on disease management especially DM (57%). This might show the burden and concern of Thai family physicians. These findings represented a reactive approach to disease management rather than a proactive approach in NCD research paradigms for two decades. Most of the studies regarded disease management to understand the risk factors, and local practice situations attempting micro-intervention programs in their practice. Few studies dealt with continuity and comprehensive measurements of the practices. From this scoping review, a few articles were proactive studies including motivational interview interventions affecting positive outcomes to diabetes control and diabetes distress, applying a chronic care model to promote well-controlled disease.^{9,10} Four articles demonstrated care for patients with chronic diseases implemented by a multidisciplinary team to assist patients in controlling their disease and having a good quality of life.¹¹⁻¹⁴ One qualitative study showed a strong doctor-patient relationship, along with family support, helped patients understand their chronic illness and develop a positive attitude about taking medicine.¹⁵ The American Family Physician annually publishes a collection of the top 20 primary care research studies. Consistently, at least one-fifth of these studies focus on chronic diseases, especially diabetes, and hypertension, reflecting the prioritization of chronic noncommunicable diseases by Family Physicians. However, a comprehensive review of studies conducted by Family Physicians in the realm of NCD remained absent.¹⁶⁻²¹

Primary care research conducted by Thai Family Physicians remains comparatively limited. Research capacity is primarily established in universities and often focuses on the hospital-based context. The RCFPT has initiated efforts to strengthen primary care research for future health challenges since 2019. Key components for developing primary care research include implementing training programs, promoting research within medical schools and institutions, actively engaging primary care practitioners, and collaborating on international partnerships. Furthermore, guidelines for the care of patients with chronic illnesses within primary care settings are being developed.^{22,23}

Thai Diabetes Clinical Practice Guidelines 2023 and Diabetes Care 2023, facilitating health behaviors, maintaining psychological well-being, and weight management are important for achieving diabetes treatment outcomes.²⁴⁻²⁶ Diabetes remission is a personalized and dynamic process that involves lifestyle modifications, dietary changes, and close monitoring of blood sugar levels. Achieving and sustaining remission requires a comprehensive approach, and family doctors are well-positioned to lead patients through these essential steps. The RCFPT and the Department of Disease Control, Ministry of Public Health, Thailand recognized this importance. 'Diabetes remission in type 2 diabetes with intensive lifestyle intervention guide for healthcare providers' has been collectively developed in Thailand since 2022.^{27,28}

Recently, WONCA in coordination with the WHO launched the WONCA Statement on NCD and PHC 2023 to emphasize two dimensions of NCD care: the proactive approach (NCD prevention and promotion) and the reactive approach (disease management).⁴ Meanwhile, the RCFPT

included 'Care for patients with chronic disease' as one of the seven EPAs. The skills include providing appropriate care to patients together with a multidisciplinary team, continuous care, and coordination with the community.^{5,6,29} The stakeholders should support Thai family physicians to work in a supportive environment to proactive NCDs approach. WHO conducts global periodic assessments of national capacity for NCD prevention and control called NCD Country Capacity Survey (NCD CCS) to all member states. The NCD CCS evaluates various aspects of a nation's health-care infrastructure, including funding mechanisms, human resource allocation, and healthcare system organization which can monitor progress and identify areas for improvement in national preparedness for managing the NCD.³⁰ Effective collaboration among all stakeholders, including the Department of Disease Control, the Ministry of Public Health, the Royal College of Physicians and Family Physicians, and the Diabetes Association of Thailand, are all key players in driving change to fight against NCD.

Conclusions

NCDs are a burden of disease globally including Thailand. Over the past two decades, Thai Family Physicians have published articles, both in terms of quantitative and qualitative methodology, increasing every year but limiting the variety of the approach. The main content of the studies showed the situations and risk factors for the disease management of diabetes and hypertensive patients in local situations. A few studies focused on health promotion and primary prevention programs, of these, the RCFPT should recognize and emphasize relevant curriculum.

Strengths and limitations

This scoping review retrieved articles from Famscholar, including Scopus and ThaiJo database. It is not linked to PubMed, a large global database, and with the exclusion of certain search terms, chronic pulmonary disease, and cancer, this research is not able to represent the full scope of NCD research conducted by Thai Family Physicians. While the Famscholar is a reliable database of Thai Family Physicians, the broad nature of certain search terms, such as "chronic," "early diagnosis," "early treatment," "multimorbidity,"

"remission," and "prevention," yields a large number of irrelevant articles (438 out of 523 articles).

Author contributions

Study conception and design were done by R.T. Main manuscript writing and revision were done by J.C. For data analysis. Data extraction, data checking, data analysis, interpretation, and revisions were done by J.C. and V.R. J.C. is the guarantor of this work such as having full access to the data in the study and taking responsibility for the integrity of the data. J.C. conceptualized the discussion framework. V.R. contributed to researched data, and the discussion, and reviewed/edited the manuscript. R.T. and S.S. conceptualized the study, contributed to the discussion, and reviewed/edited the manuscript. All authors have read and approved the final manuscript.

Disclosure

The authors declare that there are no conflicts of interest.

Funding

The study was supported by The Royal College of Family Physicians of Thailand (RCFPT).

References

1. World Health Organization. Invisible numbers the true extent of noncommunicable diseases and what to do about them [Internet]. 2023 [cited 2024 Jan 26]. Available from: <https://www.who.int/publications/item/9789240057661>
2. World Health Organization (WHO). WHO NCDs profiles Thailand [Internet]. 2018 [cited 2024 Jan 5]. Available from: https://cdn.who.int/media/docs/default-source/country-profiles/ncds/tha_en.pdf?sfvrsn=2dd69676_36&download=true
3. Aekplakorn W, Puckcharern H, Satheannoppakao W. The Thai national health examination survey VI, 2019-2020. (in Thai)
4. World Organization of National Colleges A and AA of GPP (WONCA). WONCA Statement on NCDs and Primary Health Care to WHO [Internet]. 2023 [cited 2024 Jan 3]. Available from: <https://www.globalfamilydoctor.com/News/WONCAStatementonNCDsandPrimaryHealthCaretoWHO.aspx>
5. The Royal College of Family Physicians of Thailand. Standards for quality of the Thai board of Family Medicine. 2022. p. 136-7. (in Thai)
6. The Royal College of Family Physicians of Thailand. Standards for quality of the Thai board of Family Medicine [Internet]. 2019 [cited 2024 July 12]. Available from: <https://thaifammed.org> (in Thai)

7. Tuangratananon T, Julchoo S, Phaiyaram M, Panichkriangkrai W, Pudpong N, Patcharanarumol W, Tangcharoensathien V. Healthcare providers' perspectives on integrating NCDs into primary healthcare in Thailand: a mixed method study. *Health Res Policy Syst.* 2021;19:139. PubMed PMID: 34838045
8. Chiang Mai University. Famscholar [Internet]. [cited 2024 Jan 28]. Available from: <https://famscholar.fmpccmu.com/>
9. Thepwongsa I, Muthukumar R, Kessomboon P. Motivational interviewing by general practitioners for Type 2 diabetes patients: A systematic review. *Fam Pract.* 2017;34:376-83.
10. Boonyuen Teeraporn, Suttipong Chantawat. An effect of Group motivational interview technique to decrease Thai CV risk in Hypertensive patients and diabetes mellitus type II. *Journal of Nakornping Hospital.* 2019; 10:46-58.
11. Homchampa Parkorn, Kankarn Waratip. The effect of applying a chronic care model in patients with uncontrolled hypertension and type 2 diabetes mellitus on delaying chronic kidney disease progression in primary care, Ubon Ratchathani province. *Srinagarind Med J.* 2022;37:261-7. (in Thai)
12. Anantasaran D. Effects of health care promoting program on self-care behavior and blood pressure level among older adults with uncontrolled hypertension in Langsuan municipality, Chumporn province. *Medical Journal.* 2016;30:299-311. (in Thai)
13. Falhoi Teepapote. The caring system development for diabetes mellitus patients of health service network, Bueng Sam Phan District, Phetchabun province. *Journal of Nakornping Hospital.* 2022;13:27-46. (in Thai)
14. Pisut C. Outcome comparison after group counseling in diabetic patients with early stage chronic kidney disease, Powaai Primary Care Cluster (PCC). *Medical Journal.* 2019;33:217-30. (in Thai)
15. Jiraporncharoen W, Pinyopornpanish K, Junjom K, Dejkriengkraikul N, Wisetborisut A, Papachristou I, Hashmi A, Angkurawaranon C. Exploring perceptions, attitudes and beliefs of Thai patients with type 2 diabetes mellitus as they relate to medication adherence at An Out-Patient Primary Care Clinic in Chiang Mai, Thailand. *BMC Fam Pract.* 2020;21:173. doi: 10.1186/s12875-020-01233-7. PubMed PMID: 32825811
16. Grad R, Ebell MH. Top 20 Research Studies of 2018 for Primary Care Physicians. *Am Fam Physician.* 2019; 99:565-73.
17. Ebell MH, Grad R. Top 20 Research Studies of 2019 for Primary Care Physicians. *Am Fam Physician.* 2020; 101:608-17.
18. Grad R, Ebell MH. Top 20 Research Studies of 2020 for Primary Care Physicians. *Am Fam Physician.* 2021; 104:41-8.
19. Ebell MH, Grad R. Top 20 Research Studies of 2021 for Primary Care Physicians. *Am Fam Physician.* 2022; 106:61-9.
20. Grad R, Ebell MH. Top 20 Research Studies of 2022 for Primary Care Physicians. *Am Fam Physician.* 2023;107: 406-14.
21. Grad R, Ebell MH. Top 20 Research Studies of 2023 for Primary Care Physicians. *Am Fam Physician.* 2024;110: 65-73.
22. Tumviriyakul H. Primary Care Research and Family Medicine: Different Views from Thailand and Internationally. *Journal of Primary Care and Family Medicine.* 2022;5:163-72. (in Thai)
23. Sairat N. The direction of family medicine academic developments in Thailand. *PCFM.* 2022;5:83-93. (in Thai)
24. ElSayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, et al. 8. Obesity and weight management for the prevention and treatment of type 2 diabetes: standards of care in diabetes-2023. *Diabetes Care.* 2023;46(Supplement_1):S128-39.
25. ElSayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, et al. 5. Facilitating positive health behaviors and well-being to improve health outcomes: standards of care in diabetes-2023. *Diabetes Care.* 2023;46(Supplement_1):S68-96.
26. Diabetes Association of Thailand under The Patronage of Her Royal Highness Princess Maha Chakri Sirindhorn. *Clinical Practice Guideline for Diabetes* 2023. Bangkok: Srimuang Printing; 2023. p. 49-67. (in Thai)
27. The Royal College of Family Physicians of Thailand. Diabetes remission in type 2 diabetes with intensive life-style intervention guide for healthcare providers. Working group developing treatment guidelines for new type 2 diabetes patients to achieve remission through behavioral changes and self-blood sugar testing. Bangkok: PP Media Design and Print; 2022. p. 1-12. (in Thai)
28. Bureau of Non-communicable Diseases, Department of Disease Control, Ministry of Public Health. Remission service. 2023. p. 1-14. (in Thai)
29. The Royal College of Family Physicians of Thailand. Standards for quality of the Thai board of Family Medicine. 2018. p. 179-180. (in Thai)
30. WHO. NCD country capacity survey [Internet]. 2024 [cited 2024 Apr 4]. Available from: <https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs>