

Translating Evidence on Physical Activity to a Better Active City Policy: A Brief Literature Review

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Abstract

The United Nations Sustainable Development Goal 11 commits to inclusive, safe, resilient, and sustainable cities and human settlements. Rapid urbanization can result in increased non-communicable disease burdens attributed to physical inactivity among the urban population. The patterns of physical inactivity and interventions to promote physical activity in the urban setting in Thailand are largely unknown. This study reviewed evidence on physical activity epidemiology and interventions to promote physical activity in the urban setting from the international and national studies, and recommended policy interventions that promote physical activity in the urban setting. The results suggested that promoting active transport such as walking, cycling, and use of public transport, integrating transit-oriented development in city design and planning, and supporting recreational activities for all groups of people, were key leverage policies that addressed the sedentary problem in Thailand.

Keywords: physical activity, city, effective, policy, Thailand

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บทคัดย่อ

เป้าหมายการพัฒนาที่ยั่งยืนของสหประชาชาติ หมวดที่ 11 มุ่งมั่นให้เมืองและการตั้งถิ่นฐานของมนุษย์มีความครอบคลุมปลอดภัย มีภูมิทัศน์ทางกายและยั่งยืน เนื่องด้วยการขยายตัวของเมืองที่รวดเร็วส่งผลต่อการเพิ่มภาระโรคไม่ติดต่ออันเนื่องมาจากกิจกรรมทางกายไม่เพียงพอในประชากรเขตเมือง ทั้งนี้ ประเทศไทยยังขาดข้อมูลกิจกรรมทางกายของประชากรในเขตเมือง รวมถึงหลักฐานวิชาการด้านมาตรการส่งเสริมกิจกรรมทางกายในเขตเมือง การศึกษานี้มุ่งทบทวนหลักฐานวิชาการเกี่ยวกับกิจกรรมทางกายและมาตรการส่งเสริมกิจกรรมทางกายในเขตเมืองจากนานาชาติและในประเทศ และเสนอข้อเสนอเชิงนโยบายส่งเสริมกิจกรรมทางกายในเขตเมือง ผลการศึกษาพบว่าการส่งเสริมการเดินทางด้วยการเดิน การใช้จักรยาน และขนส่งสาธารณะ การออกแบบและพัฒนาเมืองโดยใช้สถานียขนส่งสาธารณะเป็นศูนย์กลาง และการสนับสนุนนันทนาการในทุกกลุ่มวัย เป็นนโยบายสำคัญในการจัดการปัญหาพฤติกรรมเนือยนิ่งในประเทศไทย

คำสำคัญ: กิจกรรมทางกาย, เมือง, ประสิทธิภาพ, นโยบาย, ประเทศไทย

Introduction

The United Nations has estimated that urban populations will double from 30% in 1950 to 68% or around 6.7 billion people by 2050.⁽¹⁾ In response to rapid urbanization, global leaders had committed to the United Nations Sustainable Development Goal 11, inter alia, to strengthen inclusive, safe, resilient, and sustainable cities and human settlements.⁽²⁾

Sedentary and physically inactive lifestyles are common behaviors in rapid urbanization if the physical and social environments are not conducive to active living. Therefore, city planning and designs play a critical role in promoting peo-

ple's health and well-being. A healthy city policy should be the ultimate goal of urban planning and development.^(2,3) This is to address the burden of physical inactivity, the fourth leading risk factor for premature deaths from non-communicable diseases (NCDs).^(4,5)

The global community commits to an active city policy. This was reflected in the 2016 Shanghai Consensus on Healthy Cities⁽⁶⁾ and the Global Action Plan on Physical Activity (2018-2030)⁽⁷⁾ adopted by the 71st World Health Assembly in 2018. Among others, these calls for a whole-of-society response to create social, cultural, economic, and physical environments, which are conducive

to physical activity, as an active lifestyle is intrinsically related to the design of the city, physical and social environments.

Globally, in 2010, 23% of adults and elderly did not meet the global recommended level of at least 150 minutes of moderate physical activity per week.⁽⁸⁾ A similar pattern was reported in Thailand; 25.4% of adults and the elderly had insufficient physical activity in 2019,^(9,10) and urban dwellers spent a lower energy expenditure on physical activity than rural dwellers.⁽¹¹⁻¹⁴⁾

In light of rapid urbanization, it is imperative to understand patterns of physical activity among urban people to inform policymakers on the target population that needs interventions. Moreover, there is a knowledge gap in evidence on active city interventions to inform policymakers in Thailand whether existing implementations are recommended in the literature or how they should be improved. Therefore, this study aimed to: (1) identify the patterns of physical activity among the urban population both internationally and nationally; (2) determine active city interventions from recommendations found in the literature; (3) propose policy recommendations which promote physical activity in the urban setting.

This paper contains three parts: the review of international and national physical activity epidemiology, the recommended evidence for promoting physical activity, and the policy recommendations for an active city.

Information Retrieval Procedures

This study reviewed the epidemiology of

physical activity in three domains (work, transport, and recreation) via a manual search for international and national literature that was relevant to physical activity epidemiology.

This study identified the recommended interventions to promote physical activity in urban settings at both international and national levels. For international review, we conducted a literature review by searching the PubMed databases. The keywords “physical activity”, “urban”, “policy”, and “recommendation” were used to retrieve articles. The inclusion criteria of the search were: (1) physical activity interventions or policies or recommendations, (2) studies related to urban settings, (3) written in English, (4) full-text available, (5) published between 2016-2021. The exclusion criteria were target population with specific diseases such as strokes, myocardial infarction, and mental disorders. For national literature, we conducted a manual search for literature that was relevant to physical activity or health promotion policy or project implemented in the urban setting by the Department of Health since 2016. Literature search in this study was performed by one researcher.

This study also assessed progress and identified gaps in Thailand’s physical activity policy and implementation and suggested policy recommendations for an active city based on the authors’ point of view as academic experts working with the Ministry of Public Health. Relevant publications and documents retrieved from worldwide databases and Google Scholar were reviewed.

The data used in this study were retrieved from open and online publications that did not

reveal confidential individual data; thus, it was not necessary to obtain research ethics approval.

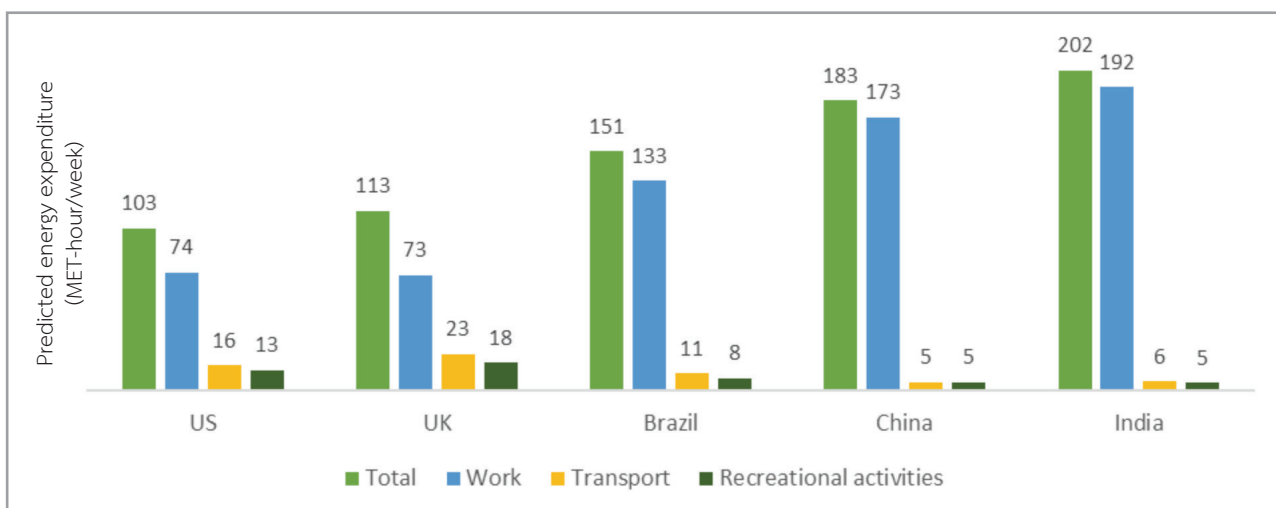
Contents

Physical Activity Epidemiology: a review of international and national evidence

- International evidence

Halal et al. reported that 31.1% of adults worldwide were physically inactive.⁽¹⁵⁾ People from the Americas region had the highest level of physical inactivity i.e., 40-60% of all age groups had insufficient physical activity while the most active were people in the Southeast Asia region, only 15-30% of all age groups were physically inactive. This study indicated that physical inactivity positively associated with age, and income of countries, as well as being female. The average

energy expenditure of people by country was also useful to shed light on the patterns of physical activity worldwide. Time use and physical activity study in five countries [United States (US), United Kingdom (UK), Brazil, China, and India] estimated energy expenditure in 2012 and projected to 2020.⁽¹⁶⁾ The findings revealed that the majority of energy expenditure was from the work domain, followed by transport and recreation. Interestingly, the total energy expenditures in high-income countries with more urbanization, such as US and UK, were lower than urban people in the other three countries – see Figure 1. Moreover, the energy expenditure from the transport domain in the UK, which had implemented many interventions in this domain,⁽¹⁷⁾ contributed the largest proportion of total energy expenditure among the five countries.



* Adapted from Ng and Popkin⁽¹⁶⁾

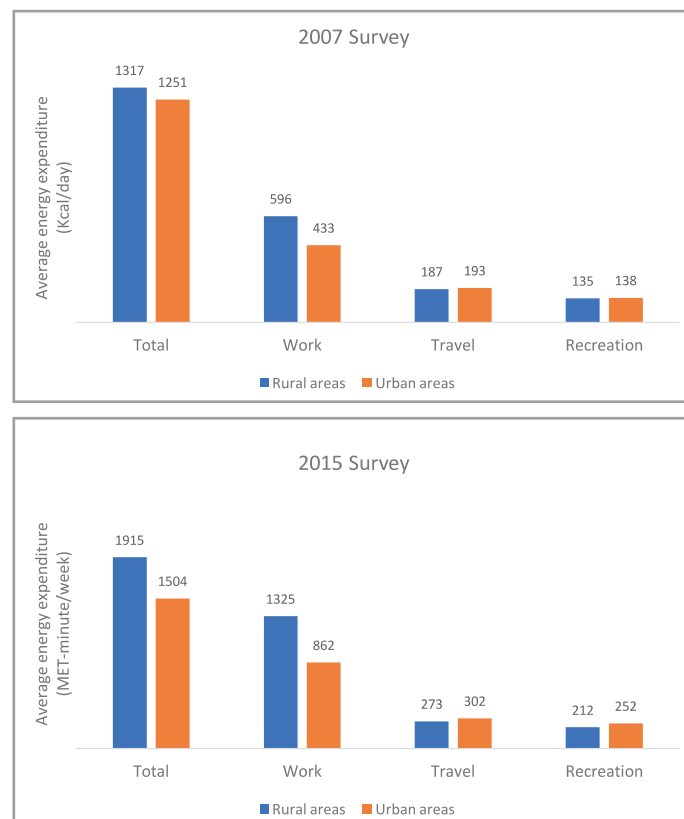
** MET = metabolic equivalent task, 1 MET equals an energy use at resting stage, 4 MET equals an energy use while walking, and 8 MET equals an energy used while running

Figure 1 Predicted energy expenditure from daily physical activity in five countries in 2020

- **National evidence**

Studies from two major national surveys, the National Survey on Physical Activity and Obesity 2007, and the National Health and Welfare Survey 2015,⁽¹¹⁻¹⁴⁾ reported similar trends of energy expenditure from physical activity. Energy expenditure in the work domain had the largest proportion of total energy consumption – see Figure 2. The least portion of energy expenditure was from the recreation domain. Rural residents spent more energy on the work domain than urban residents, while urban residents spent more energy in the recreation domain. The energy spent in the transport domain was not much different between urban

and rural residents. The results can be explained by the fact that the majority of Thai people were rural farmers who engaged in the agricultural sector that required bodily movements in a day,^(18,19) while urban residents might compensate for their sedentary work domain with active recreation domain instead.^(11-14,20-22) In the transport domain, the reason that urban people had slightly higher energy expenditure was the result of more availability of public transport infrastructure in cities.⁽²³⁾ The 2007 and 2015 surveys also showed that men, adults, and the ones who had higher education and income levels tended to spend higher energy expenditure than their counterparts.^(12,13)



* Adapted from Topothai et al.^(12,13)

** MET = metabolic equivalent task, 1 MET equals an energy use at resting stage, 4 MET equals an energy use while walking, and 8 MET equals an energy used while running

Figure 2 Energy expenditure from physical activity in Thai adults from two national physical activity surveys

Effective Physical Activity Promotion in the Urban Setting: a review of international and national evidence

- International evidence

Nine out of 212 retrieved articles were included in the study after titles, abstracts and full texts were screened – see the PRISMA flow in Figure 3. From the reviews of these nine articles, most interventions focused on urban planning and active transport policy. A systematic review from Gelius et al. suggested that physical activity could be promoted through multi-level interven-

tions. For example, infrastructure improvements in high residential or office workers density, a mixed land use between residential areas, recreational places, and public transport stations, a safe and user-friendly sidewalk and connectivity which supported physical activity, a street redesigning and lighting improvement.⁽²⁴⁾ The systematic review also suggested evidence for introducing transport taxes, congestion and fuel pricing and tax for personal motor vehicles to create a financing barrier for the use of personal motor vehicle.

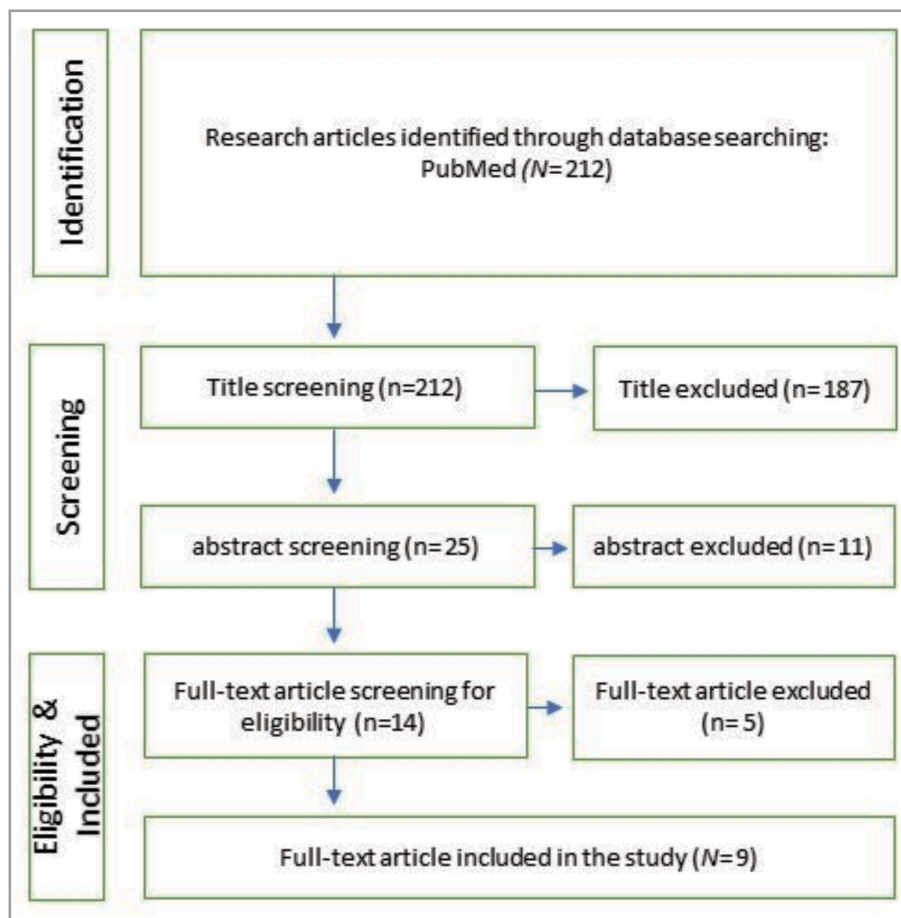


Figure 3 PRISMA flow of an international literature search on effective physical activity promotion in the urban setting

Another critical and systematic review study by Giles-Corti et al. in the Lancet series of physical activity in 2016 identified eight interventions to promote active transport. The interventions were: destination accessibility, managing demand by reducing the availability and increasing the cost of parking, designing pedestrian-friendly and cycling-friendly movement networks, achieving optimum levels of residential density, reducing the distance to public transport, and enhancing the desirability of active travel modes such as creating safe attractive neighborhoods and safe, affordable, and convenient public transport.⁽²⁵⁾

A multicenter, cluster-randomized controlled study by Audrey et al. measured the outcomes of physical activity by using accelerometers and geo-positioning system (GPS) receivers at 654 employees in 87 workplaces in seven urban areas in south-west England and south Wales. The intervention group received a 10-week workplace-based Walk to Work intervention incorporating key behavior change techniques by trained promoters. Although the results showed no evidence of an intervention effect on moderate to vigorous physical activity at the 12-month follow-up, walkers and public transport users accrued substantially higher levels of daily moderate to vigorous physical activity.⁽¹⁷⁾

A multilevel logistic regression study by Kim et al., using 129,044 individual samples living in 424 administrative districts in Seoul, revealed that the walkability score and public transport density were significantly correlated with the odds of active commuting.⁽²⁶⁾ Another study from Kim et

al. in urban areas in Seoul, Korea, revealed the positive association between better neighborhood walkability score and higher odds of active transport for noncommuting purposes i.e. leisure and shopping.⁽²⁷⁾

Sallis et al.'s cross-sectional study of 6,822 adults who lived in urban environments in 14 cities in ten countries in the Lancet series of physical activity in 2016 also found the relationships between active-friendly neighborhood environments and physical activity. The net residential density, intersection density, public transport density, and a number of parks were significantly, positively, and linearly related to physical activity.⁽²⁸⁾

In summary, literature found three types of effective interventions, namely, infrastructure improvements, active transport promoting, and active-friendly neighborhood environments.

- **National evidence**

Six pieces of literature with good practices of physical activity promotion in about 20 municipalities, mostly considered as urban settings, were retrieved.⁽²⁹⁻³⁵⁾

Studies by Khamput et al., Tuangrattananon et al., and Sangsamritpol et al., using direct observations, in-depth interviews, and documents reviews in multi-levels of municipalities throughout Thailand, found that local governments had well-implemented physical activity promotion in terms of focusing on providing active facilities such as recreational parks, gyms, sport-related stadiums, as well as providing activities such as exercise clubs and local sports festivals, health events on walking, running, and biking, and many



traditional and cultural festivals. Moreover, weekly night street markets promoted in many municipalities encouraged people going out and enjoying outdoor activities. In addition, interventions to promote physical activity in children and adolescents were also highlighted as active child centers and schools with the active syllabus, extracurricular activities, sports facilities and playgrounds. Similar interventions could be seen through elderly school interventions each week or twice a month. These activities aimed to encourage elders to join group activities or share their experiences and skills with younger generation such as crafting, cooking, singing, or they might go travelling for recreation to several interesting places.

Additionally, studies by Topothai et al., using direct observations (walk, bike, and public transport scores), in-depth interviews, self-assessment questionnaire, and documents reviews in four communities, revealed outstanding interventions in promoting daily walking and cycling.^(33,34) For example, outdoor gyms and appropriate road lighting encouraged local people in Chiang Kham, Payao, to walk, bike and exercise in the early morning and late evening every day. A cycling club and weekly cycling activity were also set up by local people in Chiang Kham. These interventions attracted residents' attention to joining activities. Another example was the Safe Route to School initiative in an urban area of Ranong Province in the south of Thailand by the Ranong District Municipality and stakeholders to promote physical activity to children and adolescents, as well as reduce traffic congestion during rush hours. This intervention

made significant changes to built environments around schools and the city, as well as active commuting practice in children.

In summary, literature found three types of effective interventions, namely, providing active facilities for recreation, activities targeted age groups, and building environments to promote daily walking and cycling.

Policy Recommendations for an Active City

Findings from physical activity epidemiology and literature review from global and national evidence helped guide active city policy. Although recommended active city interventions were mainly from high-income countries, incorporating domestic evidence and authors' perspectives as academic experts and focal points in physical activity implementing agencies could adjust guidance for the Thai urban context based on physical activity domains.

For the work domain, it is worth noting that types of work in urban areas would inevitably shift from agricultural work to office-based, and a large volume of energy requirements during work would be reduced.^(16,18,19) This changing in work characteristics is visible as demonstrated in Figure 2. Moreover, most work interventions focus on recreational activities such as sports days, exercise clubs or pedometer steps challenge,^(21,22,36,37) or even in the transport domain,⁽¹⁷⁾ which were rarely designed as the work domain. Therefore, although the physical activity promoting policy in this domain is still important, it should not be a top priority for the policy.

For the transport domain, the two Thai national surveys showed that urban residents spent more energy from physical activity in this domain than rural residents as demonstrated in Figure 2. This could imply the suitability of the transport domain interventions to urban people's lifestyles. In addition, from international literature review in the study, various active transport interventions, i.e., a safe and user-friendly sidewalk, a street design and lighting improvement, a financing barrier barring the use of personal motor vehicle, and an accessible public transport, were suggested. Literature in Thailand also suggested interventions such as daily walking and cycling initiatives in communities, and a safe route to school initiative.

More studies apart from the literature review in the present study also suggested interventions to increase physical activity in an urban setting. A study suggested more physical activity from using the Bangkok Mass Transit System (BTS) sky train in Bangkok.⁽³⁸⁾ A variety of public transport modes persuaded people to use instead of personal cars,^(26,39,40) as well as restricted car zones made it more difficult to use personal cars.⁽³³⁾ An improvement in the first-kilometer connectivity from home to public transport is also important.^(17,24) Moreover, the transit-oriented development (TOD), a response to support walking within a short distance (800 meters or 10-minute walking) by designing high-density, mixed-use, pedestrian-friendly urban areas around public transit,^(41,42) is also worth mentioning. As Thailand has tremendously

implemented a rail system in the Greater Bangkok and planned to provide more extensions to urban areas in other provinces,⁽²³⁾ the TOD concept could be used to create opportunities for the urban residents to be physically active during traveling and recreational time.^(27,42-44) Overall, the transport domain is likely to be ideal for physical activity promoting policy in an urban setting.

For the recreation domain, although physical activity in this domain contributed the least proportion of energy expenditure,^(12,13,16) two Thai national surveys showed that urban residents spent more energy from physical activity in this domain than rural residents as demonstrated in Figure 2. Therefore, physical activity promoting interventions in this domain should be implemented as they might be suitable for vigorous physical activity by urban residents.^(12-14,21,22) Taking into account well implementation of existing recreation interventions by local governments throughout cities in Thailand, full coverage of the target population remains a major challenge. To bring more people to participate in recreational activities, more values can be added to the existing facilities and interventions, for example, a provision of tree houses or sand pits in recreational parks for children,⁽³²⁾ or a provision of stores for shopping at the public transits (the concept of TOD) for adults and elderly particularly females.^(27,29,31) Seasonal or cultural events such as flower festivals in winter or water festivals during Songkran period can increase more walking steps in many generations.^(29,31)



Strength and Limitation of the Study

This study reviewed physical activity patterns and recommended active city interventions from a variety of international and national literature to generate active policy recommendations. Therefore, the proposed active city policy recommendations could be feasible and appropriate to Thailand's context. However, few limitations were found. First, this study used one international database for literature search. Hence, retrieved literature may not represent all available studies. Future research could use more databases for a more comprehensive review. Moreover, quality assessment was not applied to assess research bias, and meta-analysis was not performed to pinpoint the effectiveness of recommended interventions. So, future research could perform a systematic review and/or meta-analysis to identify more robust findings. Moreover, literature search in this study was performed by one researcher in the team, as such, there was a chance of selection bias. Finally, evidence used in the study did not take into account the effect of COVID-19. Therefore, recommended interventions should be carefully assessed according to the COVID-19 situation before implementing them.

Conclusions

As Thailand transits into a more urbanized country, it is of paramount importance to prioritize policy to promote active city according to the physical activity epidemiology and evidence. Promoting active transport such as walking, cycling and use of public transport, and integrating tran-

sit-oriented development (TOD) into city design and planning are essential. In addition, supporting recreational activities for all groups of people is crucial. All of these key leverage policies should be addressed to tackle the problem of increased sedentary behaviour in Thailand.

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