

# Prevalence and characteristics of risk factors for non-communicable diseases in semi-urban communities

## Nakhonsawan, Thailand

Juntima Nawamawat

*Department of Community Nursing,  
Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan,  
Thailand*

Wipa Prasittichok

*Department of Mental Health and Psychiatric Nursing,  
Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan,  
Thailand*

Thansinee Prompradit

*Department of Administrative Nursing,  
Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan,  
Thailand*

Suwapich Chatchawanteerapong

*Department of Community Nursing,  
Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan,  
Thailand, and*

Vipaporn Sittisart

*Department of Community Nursing,  
Boromarajonani College of Nursing, Buddhachinaraj, Phitsanuloke, Thailand*

Characteristics  
of NCDs in  
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### Abstract

**Purpose** – The purpose of this research aimed to identify the risk factors for non-communicable diseases (NCDs) and determine their prevalence and characteristics in a semi-urban community in Thailand.

**Design/methodology/approach** – The survey was designed to determine the type and prevalence of risk factors for NCDs among populations in semi-urban areas in the Takianleurn subdistrict of Nakhonsawan, Thailand. A stratified random sampling design was used to select 352 subjects, aged over 15 years and living in this region. Data were collected by questionnaire and analyzed to show frequency, percentage, mean, standard

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deviation, chi-squared, prevalence rate and prevalence rate ratio with significance indicated by  $p$ -value  $< 0.05$  and confidence interval 95 percent.

**Research limitations/implications** – The implications for the future study are as follows: (1) a comparative study between rural and urban or rural and semi-urban or urban and semi-urban should be studied to understand how risk factors cause NCDs and (2) Participatory action research should be introduced to assess the effectiveness of the decrease in NCDs risk factors management in the community.

**Practical implications** – (1) To scale up public health interventions measures to promote and prevent NCDs should be focused on behavioral risk factors of NCDs such as eating habits, physical activity, smoking and alcohol consumption. (2) Health promotion and disease prevention for decrease in NCDs should consist of reducing alcohol consumption and enhancing healthy eating habits and (3) To manage unmodified risk factors such as age, gender, educational level, etc. should be focused on surveillance and physical health examination yearly.

**Findings** – The results revealed a prevalence of NCDs of 14.8 percent. The main unmodifiable risk factors affecting NCD prevalence were gender, age, low level of education and poverty; behavioral risk factors included not eating enough fruit and vegetables, high alcohol consumption, a high-fat fast-food diet and smoking.

**Originality/value** – The prevention of NCDs requires more focus on changing the eating behavior of high-risk groups and providing easily accessible health care information and services. The entire family should be involved in the process of maintaining good health and disease prevention for all family members.

**Keywords** Non-communicable diseases, Semi-urban community, Thailand

**Paper type** Research paper

## Introduction

Non-communicable diseases (NCDs) are chronic diseases that result in the deaths of 70 percent of the world's population or about 40 *mn* people per year. In the age range of 30–39 years, about 1.5 million or around 80 percent of patients, suffered premature deaths from NCDs [1]. In 2009, Thailand had 14 *mn* patients suffering from NCDs, among whom 0.3 *mn* died from NCDs accounting for 73 percent of the nation's annual deaths, a rate greater than the average global mortality. These deaths contributed to economic losses estimated to be around 200,000 *mn* baht per year. The annual trend in the incidence of NCDs has shown a gradual increase in the number of cases and the associated cost. Diabetes mellitus (DM), cardiovascular/ cerebrovascular diseases, emphysema, cancer, hypertension (HT) and obesity are the major NCDs that can cause illness and death. Health statistics reports from the year 2007 to 2014 showed that mortality rates for cardiovascular disease, ischemic heart disease, cerebrovascular disease, HT and DM increased year over year. The World Health Organization (WHO) set nine targets for the prevention and control of chronic NCDs to decrease premature mortality from NCDs to be reached by 2025. This WHO program was intended to decrease premature mortality from cardiovascular disease, cancer, DM and chronic obstructive pulmonary disease by 25 percent among people aged 30–70 years [2]. The mortality report of 2015 showed that the main causes of NCD-related deaths in Thailand were cerebrovascular disease and ischemic heart disease [3], primarily in lower-northern Thailand [4]. Patients with NCDs require proper treatment to prevent complications that might ensue, such as cerebrovascular accidents, myocardial infarction or chronic kidney diseases. Without proper care for NCDs, the aforementioned diseases can cause complications that increase the severity of the illness and negatively affect the quality of life, hinder economic development and threaten public health as well as increase the country's health-care budget.

The WHO classified the risk factors of NCDs into three types: modifiable factors such as healthy eating, not smoking and reducing alcohol/ tea/coffee drinking; second were unchangeable risk factors such as sex and age and third, metabolic risk factors such as hyperlipidemia, hyperglycemia, HT and obesity [5]. The human-generated risk factors of NCDs include physical, mental, behavioral, socioeconomic and environmental factors. The social, cultural and environmental change affects human behavior and can promote health or leads to deterioration. A health survey conducted in 2011 showed that smokers had a 24 percent increased risk of developing NCDs; people who regularly drank alcohol increased

their risk of disease by 7.1 percent and people who were obese had an 8.8 percent higher risk of NCDs. Hypertensive patients had a 23 percent greater risk of DM than people with normal pressure. An insecure economic status led people to work harder with little or no time for exercise accompanied by irregular eating habits and a poor quality diet. Nowadays, many people are moving from rural communities to cities. Accompanying this transition, communities may integrate both urban living and country living into what are termed semi-urban communities showing both urban and rural structures, lifestyles, socioeconomic status and health problems [6]. Health risk determinants will change based on the level of the transition of the community. The more we understand the dynamics of the community and the risk factors for NCDs, the more effectively we can prevent and control NCDs. This study aimed to determine the prevalence and pattern of risk factors for diabetes, HT and cardiovascular disease to provide data for future prevention.

## **Methodology**

### *Research design*

This research was a cross-sectional study with data collected in semi-urban communities.

### *Study area*

The participants for the study were recruited in the Takeanleum subdistrict, Muang district, Nakhonsawan province, Thailand.

### *Study sampling*

The sample population consisted of 352 residents of the Takeanleum subdistrict, Muang district, Nakhonsawan province, Thailand, aged over 15 years and with a history of diabetes, HT or heart disease. A stratified sampling technique was randomly applied to select four out of 12 communities (“Moo”) in the Takeanleum subdistrict. Systematic random sampling was used to select 352 individuals from those samples. The sample size was considered to have high precision with an alpha ( $\alpha$ ) of 95 percent and an absolute error ( $d$ ) 5 percent and a total population of 4,134. Using Krejcie and Morgan’s formula [7], a sample size of 352 individuals was obtained.

### *Research instrument*

A questionnaire was used to collect the data. It comprised three parts: [1] personal data, [2] health status and [3] risk factors. The Cronbach’s  $\alpha$  coefficient of reliability for parts 2 and 3 was an acceptable 0.87 and 0.73, respectively, and the questionnaire was approved for validity by three experts [8].

### *Measurement*

A group of well-trained research assistants performed the interviews on the subjects for the three parts of the questionnaire.

### *Data collection*

All eligible participants agreed to participate in the study. All subjects were assured of confidentiality, and after obtaining written informed consent, all participants were interviewed by research assistants who were involved in the planning of data collection.

### *Data analysis*

This study used Stata 14.1 [9] to analyze data. Descriptive statistics, such as frequency and percent, were used to describe sample characteristics. Prevalence rate (PR) and prevalence

rate ratio (PRR) were used to identify the PR of NCDs and the pattern of risk factors for NCDs. The chi-squared test was used to determine the relationship between NCDs and their risk factors. The 95 percent confidence interval (95 percent CI) and *p*-value < 0.05 were used to determine statistical significance.

**Ethical considerations**

Ethical issues including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. were completely accounted for by the authors. The study protocol was approved by the Ethics Committee of Boromarajonani College of Nursing, Sawanpracharak Nakhonsawan: Authorization No: SPRNW-REC 009/2019. Informed consent was obtained by signature or the thumb print of each individual before inclusion in the study. Participants’ privacy and confidentiality during the interview were ensured, and data obtained from households and individuals were coded, anonymized and kept confidential.

**Results**

*Prevalence of NCDs*

Out of the 352 participants included in this study, we found 52 cases those who were at risk of NCDs. The PR of NCDs was 14.8 percent (95 percent CI 11.2–18.9) (Table I)

The study found that NCDs had statistically significant relationships with risk factors such as gender, age, marital status, educational level, income and body mass index. Out of all these factors, the PR of NCDs was 19 percent in female subjects, which meant that the PRR among females was significantly higher (PRR 2.26; 95 percent CI 1.20–4.25). The PR of NCDs was 19 percent in patients aged 35 years and over, which resulted in a significantly higher PRR (PRR 8.98; 95 percent CI 2.23–36.16). The PR of NCDs was 33 percent for widowed/divorced/separated persons, yielding a PRR that was significantly higher for this group (PRR 2.63; 95 percent CI 1.53–4.54). The PR of NCDs was 23 percent for individuals with only a primary school education level, which gave a PRR that was significantly higher for these individuals (PRR 3.60; 95 percent CI 1.91–6.78). The PR of NCDs was 26 percent for lower-income subjects and 9 percent in other income brackets, indicating that the PRR was significantly higher for the lower-income group (PRR 2.82; 95 percent CI 1.69–4.68) (Table II)

Risk behaviors associated with NCDs that were all statistically significant were found to include the overuse of alcohol, dietary habits such as not eating enough vegetables and fruits, adding too much salt or sugar to foods, consuming a high-fat diet, eating commercially prepared foods, eating food with coconut cream or coconut milk and drinking tea or coffee. Among all the considered factors, the PR of NCDs was 18 percent in persons who used alcohol compared to 8 percent in those who did not, so the PRR among this group was significantly higher (PRR 2.12; 95 percent CI 1.10–4.07). Regarding eating habits, this study found that the PR among persons who cooked their meals at home rather than eating at a restaurant was at 17 percent compared to those eating at restaurants or buying prepared meals from the market (4 percent), and the PRR in this group was significantly higher (PRR 4.63; 95 percent CI 1.16–18.47). The PR of NCDs among participants who never or only sometimes ate the recommended daily amounts of vegetables or fruits (>400 grams/day) was 38 percent

**Table I.**  
Prevalence of NCDs

NCD cases	Frequency	Prevalence (%)	95% CI
Case	52	14.8	11.2–18.9
Non-case	300	85.2	

**Table II.**  
Relationship,  
prevalence rate (PR)  
and prevalence rate  
ratio (PRR) between  
NCDs and unmodified  
risk factors

Unmodified risk factors	Cases ( <i>n</i> = 52)		PRR (95% CI)	$\chi^2$ test ( <i>p</i> value)
	Frequency	PR		
<i>Gender</i>				
Female ( <i>n</i> = 219)	41	0.19	2.26 (1.20–4.25)	7.18* (0.007)
Male ( <i>n</i> = 133)	11	0.08		
<i>Age (years)</i>				
≥35 ( <i>n</i> = 259)	50	0.19	8.98 (2.23–36.16)	15.99* (0.000)
<35 ( <i>n</i> = 93)	2	0.02		
<i>Marital status</i>				
Widowed/divorced/separated ( <i>n</i> = 36)	12	0.33	2.63 (1.53–4.54)	10.97* (0.001)
Single/married ( <i>n</i> = 316)	40	0.13		
<i>Educational level</i>				
Primary school ( <i>n</i> = 179)	41	0.23	3.60 (1.91–6.78)	19.13* (0.000)
Secondary school and over ( <i>n</i> = 173)	11	0.06		
<i>Occupation</i>				
Agriculture ( <i>n</i> = 88)	15	0.17	1.22 (0.70–2.11)	0.48 (0.488)
Other ( <i>n</i> = 164)	37	0.14		
<i>Income (baht/month)</i>				
≤3,200 ( <i>n</i> = 121)	31	0.26	2.82 (1.69–4.68)	17.23* (0.000)
≥3,200 ( <i>n</i> = 231)	21	0.09		
<b>Note(s):</b> * <i>p</i> < 0.05				

compared to 11 percent for those who did with a significantly higher PRR (PRR 3.52; 95 percent CI 2.19–5.68). The PR of NCDs among those subjects who added extra salt or sugar to their food while eating was 29 percent compared to 14 percent who did not, yielding a significantly higher PRR in this group (PRR 2.12; 95 percent CI 1.08–4.20). The PR of NCDs among participants who usually ate high-fat food groups was 30 percent compared to 10 percent for those who did not, revealing a significantly higher PRR for this group (PRR 2.87; 95 percent CI 1.76–4.66). The PR of NCDs among those who usually ate instant food was 28 percent compared to 10 percent for those who did not, so the PRR in this group was significantly higher (PRR 3.20; 95 percent CI 1.93–5.32). The PR of NCDs among people who usually ate food with coconut cream or coconut milk was 30 percent compared to 11 percent for those who did not, yielding a significantly higher PRR in this group (PRR 2.75; 95 percent CI 1.69–4.48). The PR of NCDs among those who usually drank sparkling or sweetened soda drinks was 32 percent compared to those who did not (6 percent), resulting in a significantly higher PRR in this group (PRR 5.08; 95 percent CI 2.91–8.87). The PR of NCDs among those who usually drank tea or coffee was 36 percent compared to those who never drank it or only occasionally drank (7 percent), giving a significantly higher PRR in this group (PRR 5.34; 95 percent CI 3.14–9.07) (Table III).

For the family and community risk factors of NCDs, this study found that the PR for NCDs was lower in communities that had organic farm crops (12 percent) than those that did not (27 percent) and the difference in terms of PRR was statistically significant (PRR 2.26; 95 percent CI 1.37–3.73) (Table IV).

## Discussion

The risk factors for increasing the likelihood of NCDs such as diet e.g. a low fruit and vegetable intake, with a diet high in fat, instant foods and fast foods were found to be more

NCDs risk behaviors	Cases		PRR (95% CI)	$\chi^2$ test ( <i>p</i> value)
	Frequency	PR		
<i>Alcohol drinking</i>				
Yes ( <i>n</i> = 234)	42	0.18	2.12 (1.10–4.07)	5.59* (0.018)
No ( <i>n</i> = 118)	10	0.08		
<i>Smoking</i>				
Yes ( <i>n</i> = 71)	7	0.10	0.62 (0.29–1.31)	1.71 (0.192)
No ( <i>n</i> = 281)	45	0.16		
<i>Source of food</i>				
Made themselves ( <i>n</i> = 297)	50	0.17	4.63 (1.16–18.47)	6.42* (0.011)
Bought from market/restaurant ( <i>n</i> = 55)	2	0.04		
<i>Eating vegetables or fruits more than 400 g/day</i>				
None or sometimes ( <i>n</i> = 53)	20	0.38	3.52 (2.19–5.68)	26.13* (0.000)
Usually ( <i>n</i> = 299)	32	0.11		
<i>Taking extra salt or sugar while eating</i>				
Usually ( <i>n</i> = 24)	7	0.29	2.12 (1.08–4.20)	4.24* (0.039)
None or sometimes ( <i>n</i> = 328)	45	0.14		
<i>High consumption of fatty food</i>				
Usually ( <i>n</i> = 81)	24	0.30	2.87 (1.76–4.66)	18.44* (0.000)
None or sometimes ( <i>n</i> = 271)	28	0.10		
<i>Eating fast foods</i>				
Usually ( <i>n</i> = 12)	4	0.33	2.36 (1.02–5.48)	3.40 (0.065)
None or sometimes ( <i>n</i> = 340)	48	0.14		
<i>Eating instant foods</i>				
Usually ( <i>n</i> = 111)	31	0.28	3.20 (1.93–5.32)	22.28* (0.000)
None or sometimes ( <i>n</i> = 241)	21	0.09		
<i>Eating food with coconut cream or coconut milk</i>				
Usually ( <i>n</i> = 74)	22	0.30	2.75 (1.69–4.48)	16.65* (0.000)
None or sometimes ( <i>n</i> = 278)	30	0.11		
<i>Drinking sparkling water or sweet water</i>				
Usually ( <i>n</i> = 115)	37	0.32	5.08 (2.91–8.87)	41.08* (0.000)
None or sometimes ( <i>n</i> = 237)	15	0.06		
<i>Drinking tea or coffee</i>				
Usually ( <i>n</i> = 98)	35	0.36	5.34 (3.14–9.07)	47.81* (0.000)
None or sometimes ( <i>n</i> = 154)	17	0.07		

**Table III.** Relationship, prevalence rate (PR) and prevalence rate ratio (PRR) between NCDs and NCDs risk behaviors

**Note(s):** \* *p* < 0.05

common among urban residents where the prevalence of NCDs was highest while behavioral risk factors such as smoking and alcohol consumption were more prevalent among rural people. This study showed that the prevalence of NCDs among people aged over 15 years in semi-urban communities was 14.8 percent, while other surveys conducted in developing countries found that the prevalence of diabetes was 2.9 percent and HT was 26 percent [10]. Similar investigations reported an overall prevalence of 18.3–46.4 percent in rural areas and 15–45 percent in semi-urban areas [11]. One study that was conducted in China found that NCDs occurred in rural communities more often than urban ones, but that there was no difference between semi-urban and urban communities [12]. The use of salt and monosodium glutamate, which are associated with HT and cardiovascular disease, and the use of which is high in Southeast and East Asian countries could be a cause [13,14].

Both this study and previous studies found the PR of NCDs among women was higher for men, especially DM [15], and NCD rates were higher in rural communities than urban ones [16]. In contrast, some results showed certain diseases clustering among men [17,18]. This study found a high prevalence of NCDs among subjects who were aged over 35 years. Previously published work also showed a higher rate of HT in the patients with age range of 20–39 years [19]. There is strong evidence of a link between poverty, low education and NCDs. In Singapore, for example, smoking and regular alcohol consumption were found to be consistently highest among men and women and the least educated ones and those with lowest income [20]. Our findings showed a higher prevalence of NCDs among those participants with a low income and low educational level. According to our data, the overuse of alcohol was linked to a higher rate of NCDs, but smoking was not. Some studies revealed no significant association between the use of alcohol or smoking and HT [18], while others found this behavior to be significantly associated with HT [21,22]. As shown earlier, not eating vegetables or fruits on a daily basis, consuming high-fat foods, drinking carbonated soft drinks and large amounts of tea or coffee were found to be significantly associated with the onset of NCDs [15,23]. In contrast, one report [24] stated that tea or coffee drinking was negatively associated with HT. Adding extra salt or sugar to food while eating was found to have a significant association with an increase in NCDs in this study and in a number of others as well. [19]. Excessive alcohol consumption is a more common risk factor in rural communities, but people in both urban and rural communities suffer a greater risk of NCDs because they do not eat a lot of fruit and vegetables every day [25].

Our cross-sectional analysis was not conducted throughout the year and some variables were self-reported, which may have resulted in a self-reporting bias. However, our interviewers were exceptionally well-trained and were allowed sufficient time to accurately transcribe the interview data.

### Conclusions

NCDs are health issues that mainly affect the middle and wealthier classes in urban communities, while this pattern can be the complete opposite in poorer rural communities. By focusing distinctly on the trends of NCDs in semi-urban communities, the present study showed a similarity to rates in purely urban areas. This study emphasized the determinants in the epidemiology of NCDs such as diabetes, HT and heart disease and provided evidence-based data on the distribution of NCDs in semi-urban community populations. There is a need to develop customized NCD prevention policies that address the differential disease burden identified in the rural–urban divide.

Family and community risk factors	Cases		PRR (95% CI)	$\chi^2$ test ( <i>p</i> value)
	Frequency	PR		
<i>Organic farm in community</i>				
No	19	0.27	2.26 (1.37–3.73)	9.98* (0.001)
Yes	33	0.12		
<i>Accessibility to health media</i>				
No	14	0.22	1.69 (0.98–2.93)	3.38 (0.065)
Yes	38	0.13		
<i>Strong and close family</i>				
No	9	0.26	1.90 (1.01–3.55)	3.70 (0.055)
Yes	4	0.14		

**Note(s):** \* *p* < 0.05

**Table IV.**  
Relationship,  
prevalence rate (PR)  
and prevalence rate  
ratio (PRR) between  
NCDs and family and  
community risk factors

**Recommendations***Suggestion for applications of the research*

- (1) A need to scale up public health intervention measures to promote and prevent NCDs. Targets should include behavioral risk factors such as eating habits, physical activity, smoking and alcohol consumption.
- (2) Health promotion and disease prevention for decreasing NCDs should consist of reducing alcohol consumption and promoting healthy eating habits.
- (3) To manage unmodified risk factors such as age, gender, educational level, etc., public health programs should concentrate on surveillance and yearly physical health examinations.

*Suggestions for future study*

- (1) A comparison between rural and urban, rural and semi-urban or urban and semi-urban communities should be undertaken to understand how risk factors in these distinct areas affect NCDs.
- (2) Participatory action research should be introduced to assess the effectiveness of decreasing the risk factors of NCDs in a variety of communities.

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### Corresponding author

Juntima Nawamawat can be contacted at: [juntima@bcnsprnw.ac.th](mailto:juntima@bcnsprnw.ac.th)

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