

# Prevalence and Factors Associated with Participation in Health Checkups among Thai Adults Aged 19-60 Years: Cross-Sectional Study at Vajira Hospital, Bangkok, Thailand

Navara Thamjamrassri<sup>1</sup> MD<sup>1</sup>, Yanisa Supasirisun<sup>1</sup> MD<sup>1</sup>, Boonphiphop Boonpheng<sup>1</sup> MD<sup>1</sup>

<sup>1</sup> Department of Urban Medicine, Faculty of Medicine, Vajira Hospital, Navamindhradhiraaj University, Bangkok 10300, Thailand

## ABSTRACT

**OBJECTIVE:** This study aims to investigate the prevalence of health checkup attendance among Thai adults aged 19-60 years and the factors associated with participation in health checkups.

**METHODS:** A cross-sectional study was conducted from October to December 2023 among 292 Thai individuals aged 19-60 years who received medical services at Vajira Hospital without prior appointments for chronic disease follow-up. Data were collected using a questionnaire comprising the following four sections: personal information, health-related and health checkups data, possible factors facilitating checkup attendance, and the reasons why non-checkup participants choose not to undergo health checkups. The factors associated with participation in health checkups were identified by multivariable logistic regression analysis with a significance level of 0.05.

**RESULTS:** A total of 156 volunteers (53.4%) participated in checkups in the past 3 years. The factors associated with participation in checkups included earning more than 20,000 Baht per month (OR 3.06, 95% CI 1.12-8.41), checkups arranged by their workplace (OR 5.64, 95% CI 2.42-13.15), and encouragement by family or friends (OR 2.18, 95% CI 1.06-4.51). Underweight (OR 0.28, 95% CI 0.10-0.81) and overweight individuals (OR 0.23, 95% CI 0.08-0.64) were less likely to participate in health checkups than people with a normal body mass index. Lastly, individuals who could participate in checkups on weekends or holidays were less likely to do so than those unable to participate (OR 0.41, 95% CI 0.18-0.96).

**CONCLUSION:** A portion of Thai adults aged 19-60 years still fails to attend health checkups. Health checkup utilization must be increased using various strategies, such as encouraging workplace-organized checkups and fostering peer encouragement, especially among low-income and underweight/overweight individuals.

## KEYWORDS:

health checkups, Thai adults, working-age

## INTRODUCTION

In this era of advanced medical innovations, noncommunicable diseases (NCDs) remain a remarkable issue and the leading cause of death worldwide, claiming up to 41 million lives

annually and accounting for 74% of all deaths. Approximately 17 million of these deaths occur before the age of 70 years. Cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes are the most prevalent NCDs

contributing to mortality, accounting for 80% of premature deaths attributed to all NCDs<sup>1</sup>.

The impact of NCDs in Thailand aligns with the global data. In 2019, deaths from NCDs ranked the highest with 268,172 individuals, accounting for 54.2% of total deaths<sup>2</sup>. In addition to health consequences, NCDs impose economic burdens, including healthcare costs, loss of economic productivity due to premature deaths, frequent absenteeism, and reduced work capacity. The Ministry of Public Health of Thailand has implemented policies to prevent and control NCDs, including reducing the risk of disease and adopting secondary prevention<sup>3</sup>. Secondary prevention aims to protect infected people from developing complications by early detection through health screenings and appropriate treatment<sup>4</sup>.

The National Statistical Office of Thailand<sup>5</sup> reveals that the working-age group constitutes the majority of the country's population, accounting for 46 million people. This group drives the economy of the country and is essential for caring for dependent populations such as children and older adults. However, one in ten of working-age individuals suffer from chronic diseases, with cardiovascular diseases, diabetes, and chronic respiratory diseases being the top three<sup>6</sup>. Therefore, advocating for health promotion, particularly by encouraging regular health checkups, is crucial for the working-age population because it reduces illness, mortality, and hospitalization rates while preparing individuals to become healthy in their elder years<sup>7-9</sup>. In Thailand, health checkups are provided without out-of-pocket fees as part of healthcare insurance schemes, such as social security plans and civil servant benefits<sup>10</sup>. However, the precise number of working-age Thais receiving annual health checkups has never been reported.

This research aims to investigate the prevalence of health checkup attendance and the factors associated with participation in health checkups among Thai adults aged 19-60 years who received outpatient medical services at Vajira Hospital. Various factors, including demographics, socioeconomics,

health-related and health checkups data, and possible facilitating or deterring factors for undergoing health checkups, were examined. To formulate strategies that enhance health checkup utilization, healthcare providers must understand relevant factors. These initiatives can advance preventive healthcare practices and foster the overall well-being among Thai adult population, thereby diminishing the illness rates, preventing premature mortality, and facilitating the preparation for healthy aging.

## METHODS

The primary objective of the study was to examine the prevalence of health checkup attendance among Thai adults aged 19-60 years. The secondary objective was to investigate the factors associated with participation in health checkups in this population. This research was conducted on a sample of Thai adults who received services at the Family Medicine Clinic, Urban Primary Care Unit, and Non-urgent Outpatient Clinic at the Vajira Hospital from October to December 2023.

This research adopted a cross-sectional design. The sample size was calculated using one sample proportion formula<sup>11</sup>. The appropriate sample size was determined to be at least 285 individuals.

The inclusion criteria for the research participants were as follows: Thai nationality, aged between 19 and 60 years, received services at Vajira Hospital without prior appointments for chronic disease follow-ups, and able to communicate in Thai. The exclusion criteria were as follows: diagnosed with neurological conditions affecting consciousness or communication, legal incapacitation, failing to complete the questionnaire, and withdrawing their consent.

Data were collected using a questionnaire comprising four sections: personal information, health-related and health checkups data, possible factors facilitating health checkup attendance, and the reasons why non-checkup participants choose not to undergo health checkups. The screening for anxiety and depression was

included in the health-related data section using the Thai version of the Hospital Anxiety and Depression Scale developed by Nilchaikovit et al. based on the English version by Zigmond and Snaith<sup>12-13</sup>. The questionnaire was evaluated for Index of Item Objective Congruence (IOC) by three family medicine physicians and received an IOC value of 0.96, indicating high congruence between questions and objectives or content.

Data were analyzed using the statistical software SPSS Version 28.0 (New York, the USA) at a significance level of 0.05. Data were reported using frequencies and percentages. Univariable and multivariable analyses were performed using multiple logistic regression analysis, reporting odds ratios (ORs) and 95% confidence intervals (CI).

For ethical consideration, this research was approved by the Research Ethics Committee, Faculty of Medicine Vajira Hospital, Navamindradhiraj University under the Research Ethics Approval Number COA 158/2566.

## RESULTS

Among the 292 participants, 69.5% were female, 60.3% were aged under 35 years old, and 54.8% had a body mass index (BMI) greater than 23 kg/m<sup>2</sup>. Most of the participants had completed at least a bachelor's degree (71.3%) and had a monthly income of less than 20,000 Baht (72.6%). The sample population predominantly consisted of students (28.8%), followed by civil servants or government employees (25%). Most of the participants had insufficient income or only sufficient for some months (55.5%) and had health insurance through the universal coverage scheme (47.3%), followed by social security scheme (24%) and civil servant benefits (19.9%). Meanwhile, 12.7% of them had a history of smoking, 27.4% reported alcohol consumption, and 39% had chronic illnesses. Most of these individuals (72.6%) perceived their health status as average, 9.9% had anxiety, and 7.2% reported depressive symptoms (table 1).

**Table 1** Personal and health-related information of Thai adults aged 19-60 years who received services at Vajira Hospital (n=292)

Characteristics	n (%)
Personal information	
Sex	
Male	89 (30.5)
Female	203 (69.5)
Age (years)	
19-34	176 (60.3)
35-60	116 (39.7)
Body mass index (kg/m <sup>2</sup> )	
Underweight (< 18.5)	35 (12.0)
Normal (18.5-22.9)	97 (33.2)
Overweight (23.0-24.9)	43 (14.7)
Obesity (> 25)	117 (40.1)
Marital status	
Single	170 (58.2)
Married/have a boyfriend/girlfriend	106 (36.3)
Widowed/divorced/ separated	16 (5.5)
Whether or not living with someone	
Living alone	47 (16.1)
Living with someone	245 (83.9)

**Table 1** Personal and health-related information of Thai adults aged 19-60 years who received services at Vajira Hospital (n=292) (continued)

Characteristics	n (%)
Education level	
Unschooling	4 (1.4)
Elementary school	17 (5.8)
High school	43 (14.7)
Diploma/vocational certificate	20 (6.8)
Bachelor degree	185 (63.4)
Postgraduate	23 (7.9)
Occupation	
Unemployed	20 (6.8)
Student	84 (28.8)
Freelance	27 (9.2)
Private business/merchant	41 (14)
Private employee	47 (16.1)
Government officer/ state employee	73 (25)
Monthly income	
No income	41 (14)
Less than 5,000 Baht	19 (6.5)
5,000-10,000 Baht	65 (22.3)
10,001-20,000 Baht	87 (29.8)
More than 20,000 Baht	80 (27.4)
Self-rated economic status	
Insufficient	50 (17.1)
Sufficient for some months	112 (38.4)
Living comfortably without saving	76 (26)
Living comfortably with saving	54 (18.5)
Health benefits	
Universal coverage scheme	138 (47.3)
Social security scheme	70 (24)
Government enterprise office	58 (19.9)
State enterprise office/Company's welfare	17 (5.8)
Private medical insurance	9 (3.2)
Health-related information	
Smoking	37 (12.7)
Alcohol drinking	80 (27.4)
Chronic diseases	116 (39.7)
Hypertension	30 (10.3)
Diabetes mellitus	11 (3.8)
Dyslipidemia	20 (6.8)
Dyspepsia/GERD	16 (5.5)
Heart disease/arrhythmia/cardiomegaly/ischemic heart disease	3 (1)
Chronic lung disease/COPD/asthma	4 (1.4)
Osteoarthritis /gout/rheumatoid arthritis	9 (3.1)
Liver disease/fatty liver	6 (2.1)

**Table 1** Personal and health-related information of Thai adults aged 19-60 years who received services at Vajira Hospital (n=292) (continued)

Characteristics	n (%)
Depression/anxiety disorder	7 (2.4)
Cerebrovascular disease	3 (1.0)
Others	54 (18.5)
Family history of chronic diseases	155 (53.1)
Self-rated health	
Poor	12 (4.1)
Fair	121 (41.4)
Good	114 (39)
Very good	35 (12)
Excellent	10 (3.4)
Anxiety symptoms	29 (9.9)
Depressive symptoms	21 (7.2)
Health checkup participation in prior 3 years	156 (53.4)

Abbreviations: COPD, chronic obstructive pulmonary disease; GERD, gastroesophageal reflux; kg/m<sup>2</sup>, kilogram per square meters; n, number; SD, standard deviation

A total of 156 participants underwent health checkups in the past 3 years, accounting for 53.4% (table 1). The following are the possible facilitating factors of undergoing health checkups among the sample group: 83.9% were being permitted work leave for health checkups, 78.4% found it convenient to undergo health checkups without additional costs, 40.1% had their workplace arranged for annual health checkups, 71.6% had health checkup facilities near their homes or workplaces, 79.8% could undergo health checkups on weekends or holidays, 50.7% were encouraged by medical personnel to undergo health checkups, 55.5% were encouraged by

family members or friends to undergo health checkups, and 67.5% received information about health checkups from various media sources (table 2).

Among the 292 individuals, 136 did not undergo health checkups in the past 3 years. The reasons for not undergoing health checkups included the following: not knowing how to start a health checkup (58.1%), lack of time (51.5%), fear of finding health problems (39%), unnecessary without symptoms of illness (32.4%), concerns about expenses (27.9%), complexity of the health checkup process (16.2%), and difficulty in accessing health checkup locations (15.4%) (table 3).

**Table 2** Possible facilitating factors of undergoing health checkups among Thai adults aged 19-60 years who received services at Vajira Hospital (n=292)

Possible facilitating factors	n (%)
Being permitted work leave for health checkups	245 (83.9)
Can undergo health checkups conveniently without additional cost	229 (78.4)
The workplace arranges for health checkups	117 (40.1)
Health checkup facilities are located near home/workplace	209 (71.6)
Possible to undergo health checkups on weekends/holidays	233 (79.8)
Encouraged by medical personnel for health checkups	148 (50.7)
Encouraged by family/friends to get a health checkups	162 (55.5)
Received health checkup information from various media	197 (67.5)

Abbreviation: n, number

**Table 3** Reasons for not undergoing health checkups among respondents who did not undergo health checkups in the past 3 years (multiple answers allowed) (n=136)

Reasons for not undergoing health checkups	n (%)
Not necessary without abnormal symptoms	44 (32.4)
Lack of time	70 (51.5)
Concern of expenses	38 (27.9)
Complexity of the health checkup process	22 (16.2)
Not knowing how to start health checkups	79 (58.1)
Fear of finding health problems	53 (39.0)
Place of health checkups is too far/difficult to go	21 (15.4)

Abbreviation: n, number

Several factors were found to be related to health checkup participation among Thai adults aged 19-60 years, and statistical significance ( $p$ -value < 0.05) was observed when controlling for confounding factors. First, individuals with a monthly income greater than 20,000 Baht was 3.06 times more likely to undergo health checkups than those with monthly income less than 20,000 Baht a month. Second, individuals whose workplaces arranged health checkups had a 5.64 times higher likelihood of receiving health checkups than those whose workplaces did not arrange health checkups. In addition, individuals

who were encouraged by family members or friends to get health checkups were 2.18 times more likely to undergo health checkups than those who did not have such encouragement (table 4).

In terms of BMI, underweight or overweight individuals were less likely to receive health checkups than those with a normal BMI, accounting for percentages of 72% (OR 0.28) and 77% (OR 0.23), respectively. Individuals who could attend health checkups on weekends or holidays were significantly less likely to receive health checkups than those who could not do so, accounting for a percentage of 59% (table 4).

**Table 4** Factors associated with participation in health checkups among Thai adults aged 19-60 years who received services at Vajira Hospital (n=292)

	Checkups n (%)	Non checkups n (%)	Univariable analysis		Multivariable analysis	
			Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Personal information						
Female	109 (53.7)	94 (46.3)	1.04 (0.63-1.71)	0.889	1.31 (0.59-2.90)	0.510
Age (years)						
19-34	82 (46.6)	94 (53.4)	Ref		Ref	
35-60	74 (63.8)	42 (36.2)	2.02 (1.25-3.27)	0.004	1.60 (0.64-4.02)	0.314
Body mass index (kg/m <sup>2</sup> )						
Underweight (< 18.5)	12 (34.3)	23 (65.7)	0.38 (0.17-0.86)	0.019	0.28 (0.10-0.81)	0.019
Normal (18.5-22.9)	56 (57.7)	41 (42.3)	Ref		Ref	
Overweight (23.0-24.9)	21 (48.8)	22 (51.2)	0.70 (0.34-1.44)	0.330	0.23 (0.08-0.64)	0.007
Obesity (> 25)	67 (57.3)	50 (42.7)	0.98 (0.57-1.69)	0.945	0.80 (0.37-1.70)	0.557
Marital status						
Married/have a boyfriend/girlfriend	46 (43.4)	60 (56.6)	Ref		Ref	
Single	85 (50)	85 (50)	0.77 (0.47-1.25)	0.286	1.28 (0.60-2.71)	0.521
Widowed/divorced/ separated	5 (31.3)	11 (68.8)	1.69 (0.55-5.20)	0.362	4.31 (0.92-20.31)	0.065
Living with someone	112 (45.7)	133 (54.3)	1.24 (0.66-2.31)	0.501	1.04 (0.43-2.53)	0.928
Education level						
Below bachelor degree	34 (40.5)	50 (59.5)	Ref		Ref	
Above bachelor degree	122 (58.7)	86 (41.3)	2.09 (1.25-3.50)	0.005	1.29 (0.52-3.22)	0.585
Occupation						
Unemployed	9 (45.0)	11 (55.0)	1.94 (0.58-6.50)	0.281	3.26 (0.67-15.86)	0.144
Students	34 (40.5)	50 (59.5)	1.62 (0.64-4.11)	0.314	2.69 (0.63-11.60)	0.184
Freelance	8 (29.6)	19 (70.4)	Ref		Ref	
Private business/merchant	14 (34.1)	27 (65.9)	1.23 (0.43-3.51)	0.697	1.04 (0.28-3.89)	0.951

**Table 4** Factors associated with participation in health checkups among Thai adults aged 19-60 years who received services at Vajira Hospital (n=292) (continued)

	Checkups n (%)	Non checkups n (%)	Univariable analysis		Multivariable analysis	
			Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Private employee	33 (70.2)	14 (29.8)	5.60 (1.99-15.77)	0.001	2.98 (0.63-14.09)	0.168
Government officer/ state employee	58 (79.5)	15 (20.5)	9.18 (3.37-25.02)	< 0.001	3.17 (0.59-17.06)	0.180
Monthly income						
Less than 20,000 Baht	91 (42.9)	121 (57.1)	Ref		Ref	
More than 20,000 Baht	65 (81.3)	15 (18.8)	5.76 (3.09-10.75)	< 0.001	3.06 (1.12-8.41)	0.030
Self-rated economic status						
Insufficient, sufficient for some months	72 (44.4)	90 (55.6)	Ref		Ref	
Living comfortably without saving	45 (59.2)	31 (40.8)	1.82 (1.04-3.15)	0.035	1.52 (0.69-3.31)	0.297
Living comfortably with saving	39 (72.2)	15 (27.8)	3.25 (1.66-6.36)	< 0.001	1.98 (0.76-5.18)	0.162
Health benefits						
Universal coverage scheme	52 (37.7)	86 (62.3)	Ref		Ref	
Social security scheme	43 (61.4)	27 (38.6)	2.63 (1.46-4.76)	0.001	1.17 (0.44-3.15)	0.755
Government enterprise office	41 (70.7)	17 (29.3)	3.99 (2.06-7.73)	< 0.001	0.85 (0.22-3.31)	0.815
State enterprise office/Company's welfare	13 (76.5)	4 (23.5)	5.38 (1.66-17.36)	0.005	1.91 (0.36-10.17)	0.450
Private medical insurance	7 (77.8)	2 (22.2)	5.79 (1.16-28.92)	0.032	3.79 (0.57-25.34)	0.169
Health related information						
Smoking	14 (37.8)	23 (62.2)	0.48 (0.24-0.98)	0.045	1.25 (0.39-3.96)	0.708
Alcohol drinking	36 (45)	44 (55)	0.63 (0.37-1.05)	0.077	0.93 (0.42-2.08)	0.861
Chronic diseases	74 (63.8)	42 (36.2)	2.02 (1.25-3.27)	0.004	1.81 (0.89-3.68)	0.101
Family history of chronic diseases	91 (58.7)	64 (41.3)	1.58 (0.99-2.50)	0.055	1.18 (0.62-2.29)	0.611
Self-rated health						
Poor, fair	67 (50.4)	66 (49.6)	Ref		Ref	
Good, very good, excellent	89 (56)	70 (44)	1.25 (0.79-1.99)	0.340	0.84 (0.43-1.63)	0.598
Anxiety symptoms	6 (20.7)	23 (79.3)	0.20 (0.08-0.50)	< 0.001	0.28 (0.07-1.21)	0.088
Depressive symptoms	7 (33.3)	14 (66.7)	0.41 (0.16-1.05)	0.062	1.67 (0.29-9.58)	0.565
Possible facilitating factors						
Being permitted work leave for health checkups	137 (55.9)	108 (40.4)	1.87 (0.99-3.53)	0.053	1.50 (0.50-3.82)	0.395
Can undergo health checkups conveniently without additional cost	127 (55.5)	102 (44.5)	1.46 (0.83-2.56)	0.185	0.80 (0.35-1.82)	0.596
The workplace arranges for health checkups	95 (81.2)	22 (18.8)	8.07 (4.62-14.10)	< 0.001	5.64 (2.42-13.15)	< 0.01
Health checkup facilities are located near home/workplace	127 (60.8)	82 (39.2)	2.88 (1.70-4.90)	< 0.001	1.54 (0.73-3.25)	0.260
Possible to undergo health checkups on weekends/holidays	123 (52.8)	110 (47.2)	0.88 (0.50-1.57)	0.666	0.41 (0.18-0.96)	0.040
Encouraged by medical personnel for health checkups	90 (60.8)	58 (39.2)	1.83 (1.15-2.92)	0.011	1.13 (0.55-2.31)	0.747
Encouraged by family/friends to get a health checkups	98 (60.5)	64 (39.5)	1.90 (1.19-3.04)	0.007	2.18 (1.06-4.51)	0.035
Received health checkup information from various media	108 (54.8)	89 (45.2)	1.19 (0.73-1.94)	0.491	0.86 (0.43-1.76)	0.687

Abbreviations: CI, confidence interval; kg/m<sup>2</sup>, kilogram per square meters; n, number; OR, odd ratio; Ref, reference

## DISCUSSION

This study found that 53.4% of participants underwent health checkups in the past 3 years. This figure is relatively higher than that reported by Ohnishi et al and Lal et al<sup>14-15</sup>, who studied the working-age population in Japan and found health checkup rates in the past year ranging from 31.8% to 43.9%. The prevalence of health checkups studied in the current research was based on 3-year data according to Thailand's health checkup guidelines<sup>4</sup>; meanwhile, the Japanese study collected 1-year data. Thus, the difference in time frame may have contributed to the high prevalence. In addition, this difference may be attributed to the different characteristics of the populations studied.

The population in the current study received services at Vajira Hospital, located in urban areas, where higher rates of health checkups are typically observed compared with those in rural populations<sup>15</sup>. Moreover, the sample group was individuals receiving healthcare services at hospitals, potentially indicating their greater access to medical services compared with the general population.

In terms of positive factors related to receiving health checkups, individuals with a monthly income of more than 20,000 Baht had 3.06 times higher odds of undergoing health checkups compared with those with a lower income. This finding is consistent with previous research findings indicating that individuals with good socioeconomic status

are likely to undergo health checkups<sup>8,16-18</sup>. Meanwhile, individuals facing economic and social challenges are less likely to access healthcare services and have low health literacy<sup>19-20</sup>.

Individuals who have their workplace-arranged health checkups were 5.64 times more likely to undergo health checkups than those who do not. This factor is considered the most influential in this study. This finding can be explained by the Health Belief Model theory<sup>20</sup>, which describes human health behavior. Having health checkups arranged at the workplace helps reduce perceived barriers, which are significant negative factors affecting health checkups. Therefore, good health checkup behavior is encouraged. The complexity and procedures involved in health checkups, need to take time off work or allocate personal time for health checkups, difficulties traveling to health checkup locations, and relatively high expenses associated with health checkups act as barriers to good health checkup behavior that could be overcome if all workplaces arrange for health checkups.

Another positive factor influencing health checkups is that individuals who were encouraged or recommended by their family members or friends to undergo health checkups were 2.18 times more likely to do so than those not receiving such encouragement. This finding can be explained by encouragement acting as a stimulus, which is required in addition to the perceived benefits of health checkups to induce health-related behaviors according to the Health Belief Model theory<sup>21</sup>. In addition, families promote healthy behaviors among their members<sup>22</sup>.

In terms of negative factors affecting health checkups, underweight or overweight individuals were less likely to undergo health checkups than those with normal BMI, accounting for percentages of 72% (OR 0.28) and 77% (OR 0.23), respectively. According to Pengpid<sup>23</sup>, individuals with overweight tend to exhibit significantly worse health behaviors than those with normal BMI. This behavior reflects a lack of concern for one's health, leading to less emphasis on health checkups compared with that among individuals with normal BMI.

Meanwhile, individuals who undergo health checkups are more likely to receive recommendations for appropriate weight management and thus achieve a normal BMI than those who do not undergo health checkups<sup>24</sup>.

Another negative factor found in this study is that individuals who can undergo health checkups on weekends or holidays were 59% less likely to undergo health checkups than those who cannot do so. This factor contradicts the findings of Ohnishi et al<sup>14</sup> in Japan, who found that weekend health checkups promote health checkup behavior. This difference may be attributed to the utilization of healthcare benefits: most Thai individuals can only claim their healthcare benefits during official working hours. If not covered by private health insurance, undergoing health checkups on weekends often requires out-of-pocket expenses. However, unknown confounding factors might exist beyond those considered in this study between the Thai and Japanese populations. Therefore, further research is warranted to investigate the underlying reasons for not undergoing health checkups among individuals influenced by this factor.

The main reasons for not undergoing health checkups are not knowing how to start health checkups (58.1%), followed by lack of time to undergo health checkups (51.5%). According to the Health Belief Model<sup>21</sup>, these reasons are perceived barriers to health checkup behavior. Even though this population perceives the benefits of health checkups, the desired behavior will not occur if the perception of barriers outweighs the perception of benefits. Therefore, in addition to providing public awareness of the benefits of health checkups, reducing the perception of barriers to health checkups is one of the measures to solve the problem of nonattendance for health checkups. This measure can be achieved by establishing clear service guidelines in hospitals for those seeking health checkups, setting up clinics specifically for health checkups, widely disseminating information to the public, and providing pre-appointment channels to reduce the time required for health checkups.

The strength of this research lies in its focus on Thai adults aged 19-60 years received services at Vajira Hospital. Multiple logistic regression analysis was conducted to isolate the actual factors associated with health checkups by removing other confounding variables. The findings can serve as a guideline for conducting related studies on health checkup attendance and can be utilized to develop strategies for promoting health checkups.

This research has a limitation. It focuses on Thai adults aged 19-60 years who seek services at Vajira Hospital. This may only represent a part of the adult population. Future studies must include surveying adult population in different areas to obtain a representative sample of the entire population. Further study is also warranted to investigate potential hidden factors among individuals who can undergo health checkups on weekends/public holidays that may contribute to their reluctance to undergo health checkups.

## CONCLUSION

The prevalence of health checkup attendance is 53.4% among Thai adults aged 19-60 years received services at Vajira Hospital over the past 3 years. The positive factors significantly associated with health checkups are as follows: monthly income of more than 20,000 Baht, workplace arranging health checkups, and encouragement by family members or acquaintances to undergo health checkups. Meanwhile, the negative factors include low or high BMI and undergoing health checkups on weekends/public holidays. The results indicate that a portion of Thai adults still have not attended health checkups. Healthcare providers should implement strategies to increase health checkup attendance by encouraging workplaces to organize health checkups and campaigning for peer encouragement to undergo health checkups, especially among those with low income and are underweight or overweight.

## CONFLICT OF INTEREST

The authors declared no conflict of interest.

## ACKNOWLEDGEMENT

The authors would like to acknowledge all participants for their valuable information.

## DATA AVAILABILITY STATEMENT

All of the data generated and analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

## REFERENCES

1. World Health Organization. Non-communicable diseases [internet]. 2023 [cited 2023 Jul 23]. Available from: <https://www.who.int/news-room/fact-sheets/detail/non-communicable-diseases>
2. World Health Organization. WHO mortality database Thailand [internet]. 2020 [cited 2023 Jul 23]. Available from: <https://platform.who.int/mortality/countries/country-details/MDB/thailand>
3. The Ministry of Public Health of Thailand, the World Health Organization, the United Nations Development Programme, and the United Nations Inter-Agency Task Force. Prevention and control of non-communicable diseases in Thailand the case for investment [internet]. 2021 [cited 2023 Jul 25]. Available from: [https://thailand.un.org/sites/default/files/2021-11/%E6%9C%80%E6%96%B0%EF%BC%BFTHAILAND\\_NCD%20IC%20REPORT\\_v06\\_231121.pdf](https://thailand.un.org/sites/default/files/2021-11/%E6%9C%80%E6%96%B0%EF%BC%BFTHAILAND_NCD%20IC%20REPORT_v06_231121.pdf)
4. Institute of Medical Research and Technology Assessment, Department of Medicine, Ministry of Public Health. Essential and suitable health check-ups guidelines for the general public 2022 [internet]. 2022 [cited 2023 Jul 25]. Available from: [https://www.dms.go.th/backend/Content/Content\\_File/Publication/Attach/2565020111409AM\\_Medical%20Examination%201-02-2022%20final.pdf](https://www.dms.go.th/backend/Content/Content_File/Publication/Attach/2565020111409AM_Medical%20Examination%201-02-2022%20final.pdf)
5. Division of Strategy and Residential Information, Department of Academic and Innovation Development for Housing, National Housing Authority. Population and

- housing data report, year 2022 [internet]. 2023 [cited 2023 Aug 1]. Available from: <https://housingkc.nha.co.th/files/article/attachments/aed52b2717f2d051d449844fc4f1ddc6.pdf>
6. Thai Health Promotion Foundation. Survey results: 1 in 10 Thai working-age individuals suffer from chronic health conditions [internet]. 2012 [cited 2023 Aug 1]. Available from: <https://www.thaihealth.or.th/?p=231939>
  7. Yun B, Oh J, Choi J, Rozek LS, Park H, Sim J, et al. Socioeconomic disparities in the association between all-cause mortality and health check-up participation among healthy middle-aged workers: a nationwide study. *J Korean Med Sci* 2023;38(50):e384.
  8. Hozawa A, Kuriyama S, Watanabe I, Kakizaki M, Ohmori-Matsuda K, Sone T, et al. Participation in health check-ups and mortality using propensity score matched cohort analyses. *Prev Med* 2010;51(5):397-402.
  9. Tatara K, Shinsho F, Suzuki M, Takatorige T, Nakanishi N, Kuroda K. Relation between use of health check ups starting in middle age and demand for inpatient care by elderly people in Japan. *BMJ* 1991;302(6777):615-8.
  10. Public Health Act, B.E. 2019 [internet]. 2019 [cited 2023 Oct 20]. Available from: [https://www.ratchakitcha.soc.go.th/DATA/PDF/2562/A/056/T\\_0165.PDF](https://www.ratchakitcha.soc.go.th/DATA/PDF/2562/A/056/T_0165.PDF)
  11. Naing L, Nordin R, Rahman HA, Naing YT. Sample size calculation for prevalence studies using Scalex and ScalaR calculators. *BMC Medical Research Methodology* 2022;22(1):1-8.
  12. Nilchaikovit T, Lortrakul M, Phisansuthideth U. Development of Thai version of hospital anxiety and depression scale in cancer patients. *J Psychiatr Assoc Thailand* 1996;41(1):18-30.
  13. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67(6):361-70.
  14. Ohnishi M, Nakao R, Kawasaki R, Tanaka J, Kosaka S, Umezaki M. Factors associated with failure to undergo health check-ups in Nagasaki prefecture, Japan. *J Rural Med* 2023;18(1):28-35.
  15. Lal S, Nguyen TXT, Sulemana A-S, Khan MSR, Kadoya Y. Does financial literacy influence preventive health check-up behavior in Japan? a cross-sectional study. *BMC Public Health* 2022;22:1704.
  16. Kim B, Lee Y, Noh JW, Kim TH. Factors associated with health check-up and cancer screening participation among family caregivers of patients with dementia: a cross-sectional study. *BMC Public Health* 2021;21(1):1753.
  17. Schülein S, Taylor KJ, Schriefer D, Blettner M, Klug SJ. Participation in preventive health check-ups among 19,351 women in Germany. *Prev Med Rep* 2017;6:23-6.
  18. Shimoda A, Saito Y, Ooe C, Kondo N. Income-based inequality in nationwide general health checkup participation in Japan. *Public Health* 2021;195:112-7.
  19. Aljassim N, Ostini R. Health literacy in rural and urban populations: a systematic review. *Patient Educ Couns* 2020;103(10):2142-54.
  20. McMaughan DJ, Oloruntoba O, Smith ML. Socioeconomic status and access to healthcare: interrelated drivers for healthy aging. *Front Public Health* 2020;8:231.
  21. Janz NK, Becker MH. The health belief model: a decade later. *Health Educ Q* 1984;11(1):1-47.
  22. Ho YL, Mahirah D, Ho CZ, Thumboo J. The role of the family in health promotion: a scoping review of models and mechanisms. *Health Promot Int* 2022;37(6):daac119.
  23. Pengpid S, Peltzer K. Associations between behavioural risk factors and overweight and obesity among adults in population-based samples from 31 countries. *Obes Res Clin Pract* 2017;11(2):158-66.
  24. Alageel S, Gulliford MC. Health checks and cardiovascular risk factor values over six years' follow-up: matched cohort study using electronic health records in England. *PLoS Med* 2019;16(7):e1002863.