



Awareness and Knowledge of Coronary Heart Disease among the General Population: A Systematic Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Coronary heart disease (CHD) is one of the cardiovascular diseases that become the leading cause of death (LCOD) in the United States. Knowledge gaps in CHD and its risk factors are significant obstacles to effective prevention and treatment. People's awareness of CHD and their knowledge of its risk factors could provide crucial information for behavior change in the prevention of CHD. Therefore, the purpose of this review was to examine some of the literature on the knowledge and awareness of CHD in the general population.

Study Design: Systematic Review.

Methodology: Two databases were searched for publications between 2011 and 2021. All studies that were published in English and had components of awareness and knowledge related to CHD were included. A total of 1082 titles and abstracts were screened, 55 full-text articles were assessed and 15 were included for review.

Results: This review used data from a total of 4907 respondents and the results were varied. Studies that were conducted in the same countries might have different results. Men and participants with a college education have better knowledge than their counterparts. Meanwhile, another study shows that the elderly have poor knowledge about CHD. Several studies conducted

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among university employees showed that the majority of participants had poor knowledge of risk factors, while another study showed good knowledge.

Conclusion: Our review study showed that most of the study participants had low awareness of CHD and knowledge of its risk factors. Family history of CHD, risk factor profile, and some sociodemographic factors have been reported to be associated with the awareness and knowledge of CHD. Providing health information by healthcare professionals can be the right way to increase people's awareness and knowledge in order to prevent CHD in the future.

Keywords: Coronary heart disease; awareness; knowledge; cardiovascular disease.

1. INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of mortality and morbidity in the general population of many developed and developing countries [1]. Coronary heart disease (CHD) is the most common type of CVD in adults and has become a serious public health concern. CHD claimed the lives of an estimated eight million people worldwide in 2013, with the number expected to rise to 11.1 million by 2020. In 2030, CHD is expected to be the leading cause of death worldwide [2]. In the United States, in 2018, CHD became the leading cause of death in CVD with a percentage of 42.1%, followed by stroke (17.0%), hypertension (11.0%), heart failure (9.6%), artery disease (2.9%), and other combined minor CVD causes (17.4%) [3,4].

Atherosclerosis is the most common cause of CHD, and its progression is linked to environmental and genetic factors [5]. A study conducted in Saudi Arabia showed that smoking, hypercholesterolemia, overweight, obesity, physical inactivity, hypertension, diabetes, fast food consumption, and psychological stress are the key modifiable risk factors that contribute to the development and progression of CHD [6]. As people age, their risk of CHD increases [7]. These risk factors have been found and operate in a variety of ways with other genetic, physiological, and environmental factors to alter the incidence of CVD or the short or long-term outcome of the disease of the disease [1]. A person should have a basic knowledge of the risk factors for CHD and believe that they are at risk. When a person is aware that keeping a healthy weight, engaging in physical activity, eating a healthy diet, and quitting smoking can reduce their CHD risk, they are more likely to engage in beneficial behaviors to avoid CHD. The lack of knowledge about CHD risk factors is concerning because increased knowledge and awareness have been associated with increased measures to reduce these risk factors [8–11]. Furthermore, better comprehension and knowledge of disease

symptoms and risk factors helps people correctly assess their personal risk, inspires the search for preventive measures, and has been linked to higher risk-reducing activity [12,13].

Although there are lots of studies that demonstrate people's awareness and knowledge of CHD, the outcomes of these investigations have varied significantly. Therefore, the purpose of this study was to review and analyze some of the literature on awareness of CHD and knowledge of its risk factors in the general population.

2. MATERIAL AND METHODS

2.1 Study Identification

This study is a systematic review to examine some literature on the awareness and knowledge related to CHD from several countries. The steps are broken down into three categories: first, we identified relevant studies on our topic; second, we assessed the studies that had been retrieved using eligibility criteria; third, for each study, we performed a review and data extraction. A thorough search was conducted in the databases (PubMed and ScienceDirect) and Google Scholar to find all relevant studies. The Boolean operators "AND" and "OR" were used to search as follows: coronary heart disease, coronary artery disease, awareness, and knowledge, in combination. The searches were restricted to studies in which they appeared in the title or abstract. The scope of this review includes qualitative, quantitative, and experimental studies published over the last 10 years (between 2011 and 2021). Studies published in English and evaluated components of awareness and knowledge related to CHD were included. Participants in the studies included men, women, or both. Studies that were written in languages other than English, conducted primarily on individuals under the age of 18, and were case reports, comments, reviews, or editorials were excluded from this evaluation.

Table 1. Study Characteristics

No	Authors	Year	Country	Method	Sample size	Population target	Approach
	Ramachandran et al [14]	2016	Singapore	Cross-sectional study	200	Employee at a university	Questionnaire survey
2	Nolan & McKee [15]	2015	Ireland	Cross-sectional study	84	Post-PCI patients	Questionnaire survey
3	Jin et al [16]	2020	New South Wales	Qualitative descriptive study	18	Chinese population	In-depth interview
4	Chan et al [17]	2011	Hong Kong	Cross-sectional study	463	Chinese population	Questionnaire survey
5	McDonnell et al[18]	2014	Hong Kong	Cross-sectional study	1654	Canadian population	Questionnaire survey
6	Mohan et al [19]	2017	Punjab	Cross-sectional study	800	Punjab population	Phase 1: sending health education messages via SMS Phase 2: telephone questionnaire
7	Mooney & Franks [20]	2011	Arkansas	Cross-sectional study	45	Arkansas population	Written and telephone questionnaire
8	Dalusung-Angosta [21]	2013	Nevada	Descriptive study	120	Filipino-American population	Questionnaire survey
9	Crouch & Wilson [22]	2011	South Australia	Exploratory study	65	Rural Australian population	Questionnaire survey
10	Akintunde et al [23]	2015	Nigeria	Cross-sectional study	206	Employee at a university	Questionnaire survey
11	Pandey & Khadka [24]	2012	Nepal	Cross-sectional study	405	Nepal population	House-to-house survey
12	Al Khayyal et al [25]	2016	Egypt	Descriptive study	150	Elderly residents	Face-to-face interview using single open-ended questions
13	Winham & Jones [26]	2011	Arizona	Cross-sectional study	172	African American ancestry	Questionnaire survey
14	S et al [27]	2013	Egypt	Cross-sectional study	125	Egypt population	Interview questionnaire
15	Jamaludin et al [28]	2019	Malaysia	Cross-sectional study	400	Malaysia population	Questionnaire survey

Abbreviation: PCI, percutaneous coronary intervention

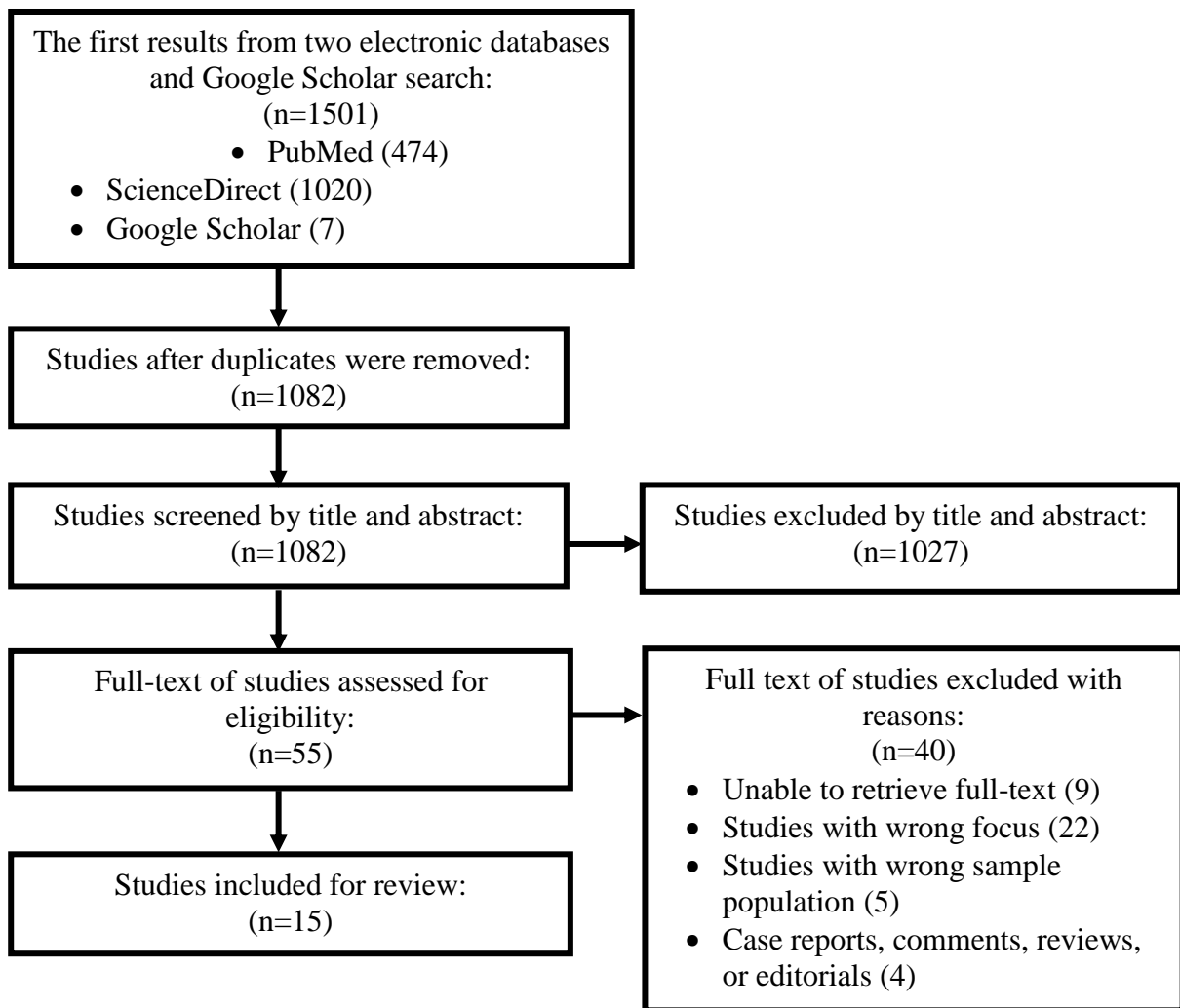


Fig. 1. Flowchart of search results

2.2 Study Quality Assessment

A total of 1082 studies were found and after further review, 15 studies that met the eligibility criteria were included, as shown in Fig. 1.

2.3 Data Extraction

Data is extracted in a tabular format which includes details of the study objective, sample characteristics, measurements, and findings. Disagreements or discrepancies in data extraction were resolved by discussion among the authors.

3. RESULTS AND DISCUSSION

3.1 Results

The participants in the retrieved studies were all from the general population and conducted in

various countries such as Singapore, Ireland, New South Wales, Hong Kong, Punjab, Arkansas, Nevada, South Australia, Nigeria, Nepal, Egypt, Arizona, and Malaysia. The studies consisted of 11 cross-sectional studies, one qualitative study, one exploratory study, and two descriptive studies. The summary of study characteristics retrieved for this study is shown in Table 1.

3.1.1 Study participants

Ten studies were conducted in young adulthood participants (beginning at the ages of 18, 19, 21 and 25), one study in adulthood (beginning at the age of 35), one study in old age (60 years or older), and three other studies did not specifically mention age. Most studies were conducted in men and women, while only three studies were conducted in women. The types of participants in

the studies were mainly those without a medical history of CHD, and only a few had a personal or family history of CHD.

3.2 Discussion

This review explored the awareness and knowledge of CHD among the general population in several countries. The review used data from a total of 4907 respondents in 15 studies and shows varied results (Table 2). A study of Mangalore residents showed that while they understood the CHD-related health risk and were aware of the key prevention strategies, they did not put them into practice [29]. A 2011 study on the rural population in Australia showed a sufficient level of knowledge about CHD among participants, although knowledge about cholesterol and diabetes was still lacking [22]. In the same year, a study on the knowledge of heart disease in African-American young adults showed that men and those with college education were more knowledgeable about many risk factors and strategies for preventing CHD than their counterparts. Moreover, college-educated and older participants were substantially more aware of heart disease as the leading cause of death [26]. This shows that the level of education is closely related to the level of knowledge a person has.

A study conducted in Singapore in women who work at a university showed that most of the participants knew that obesity, high blood pressure, high cholesterol levels, smoking and family history of CHD were risk factors for CHD, although knowledge of low HDL and high LDL as other risk factors for heart disease is still lacking. Furthermore, nearly half of the participants also showed a good awareness that CHD is the leading cause of death [14]. Another study in Nigeria that was also conducted on university workers actually showed the opposite result. The results of measuring the level of knowledge about risk factors for heart disease among participants showed that most of them had a low level of knowledge, although they work in the university community [23]. Meanwhile, another study that was also conducted on women showed that most of the participants had a medium level of knowledge, and 48% of the participants were moderately informed about heart disease, heart health, and risk factors related to it [18].

The findings of another study conducted in Nepal in 2012 showed that men, aged 30 years and

older, literate participants, and those with a family history of heart disease had better knowledge about the prevention of CHD than their counterparts, but overall, 42.2% of the participants had insufficient knowledge about heart disease [24]. One year later, a similar study was conducted in Egypt and showed that participants' total knowledge of CHD was satisfactory, but there was still a small proportion of participants who did not know what CHD was. Furthermore, most of the participants had a positive attitude toward all preventive measures. The study also stated that there was no correlation between the level of knowledge and the family history of CHD [27]. However, in Egypt, a study conducted in the city of Alexandria shows that knowledge of CHD risk factors, perceptions of risk, and adoption of preventive actions among the elderly (60 years or older) are still poor. Most of them do not believe that they have a high risk of developing CHD in their life [25]. The score for the level of knowledge of Filipino-Americans aged 35 to 37 years old showed a higher mean, but their awareness of diabetes, cholesterol, and abdominal obesity was still lacking [21].

A study by Jamaludin [28] mentioned that participants with high blood pressure and heart disease were more aware of getting and taking medications for their illness than people with high blood cholesterol and diabetes. However, the study showed that most participants have good knowledge, but their perception and awareness of the symptoms of CHD are still limited. Meanwhile, a study conducted on the Chinese population with a history of CHD showed that most of them had poor knowledge of risk factors for CHD. Furthermore, most participants are unaware of the relationship between the incidence of CHD and risk factors such as diabetes and hypertension [16]. Another study, which was also carried out in the Chinese population with participants divided into low-risk (LR), high-risk (HR) and myocardial infarction (MI) groups, showed a lack of knowledge of the typical symptoms of CHD and several risk factors, such as diabetes and a family history of CHD [17].

There are also studies that provide an intervention before measuring the level of knowledge, such as the research by Mohan [19], who conducted the intervention through sending health education messages about healthy heart habits to the participants enrolled.

Table 2. Summary of the studies

No	Authors	Study objective	Sample characteristics	Measurements	Findings
1	Ramachandran et al [14]	To investigate awareness, knowledge, healthy lifestyle behaviors and their correlates to CHD among working women in Singapore	<ul style="list-style-type: none"> □ Women □ Aged 21 to 65 years □ Not medically diagnosed with CHD 	<ul style="list-style-type: none"> □ Awareness of CHD being the leading cause of death among women in Singapore □ Knowledge of CHD risk factors □ Health-related lifestyle behaviors 	<ul style="list-style-type: none"> □ Almost half of the participants could identify CHD as the leading cause of death among women in Singapore □ Most of the participants could correctly identify many of the CHD risk factors, except high LDL and low HDL □ Most of the participants have good behaviors and could correctly identify many of the CHD risk factors, except high LDL and low HDL
2	Nolan & McKee [15]	To investigate participants' risk factor profile, knowledge of CHD, and the influence of demographic and risk factors on this knowledge	<ul style="list-style-type: none"> □ Men and women □ The age requirement is not specifically mentioned □ Post-PCI patient that enrolled between 0 and 4 months after discharge 	<ul style="list-style-type: none"> □ Awareness of CHD risk □ Five domains of knowledge: diet, epidemiology, medical, risk factors, and symptoms □ The influence of risk factor profile on knowledge level 	<ul style="list-style-type: none"> □ Post-PCI patients have poor knowledge and awareness of their cardiovascular risk □ Most patients believed that CHD was no longer a worry after PCI □ The highest knowledge score was achieved in the risk factors domain (61%) and the lowest score was in the medical and symptoms domains (both 46%) □ Knowledge levels are not influenced by risk factors profile
3	Jin et al [16]	To investigate multilevel and interactive elements of individual, family, institutional, community, and policy factors that influence engagement with CHD primary and secondary prevention among Chinese immigrants	<ul style="list-style-type: none"> □ Men and women □ The age requirement is not specifically mentioned □ Chinese patient or their close family member □ Medically diagnosed with CHD in the previous 6 months 	<ul style="list-style-type: none"> □ Awareness and knowledge of CHD risk factors □ Adherence to medication as a primary prevention of CHD □ Attendance to cardiac rehabilitation (CR) as a secondary prevention of CHD 	<ul style="list-style-type: none"> □ Most participants had poor knowledge of CHD risk factors, thus delaying their diagnosis and treatment □ Most participants were unaware of the link between CHD and risk factors such as diabetes and hypertension □ Most participants had not participated in a CR program and had not taken their prescribed CVD medication
4	Chan et al [17]	To explore CHD knowledge among the Chinese population in Hong Kong	<ul style="list-style-type: none"> □ Men and women □ Aged 18 years or older □ Three sample groups: low risk (LR) group recruited from the public 	Three subscales of CHD knowledge: CHD trends, causal attributions, and typical symptoms	<ul style="list-style-type: none"> □ The LR and HR groups have a lack of knowledge about the typical symptoms of CHD and several of its risk factors, such as diabetes and a family history of CHD. □ The 3 groups (total scale, CHD trends, and

No	Authors	Study objective	Sample characteristics	Measurements	Findings
			domains, high risk (HR) group recruited from coronary unit of hospital, and myocardial infarction (MI) group recruited from cardiac rehabilitation and prevention center		causal attribution subscales) scored significantly different levels of knowledge (P<0.017) <ul style="list-style-type: none"> □ Knowledge among women and older participants (aged 60 to 91 years) was significantly higher in the total and subscale scores than their counterparts □ The typical symptoms subscale revealed significant differences (P<0.05) between the LR–HR and LR–MI groups, but not between the HR and MI groups (P=0.140)
5	McDonnell et al [18]	To examine: (1) awareness and knowledge of heart disease and heart health; (2) attitudes/values, perceptions, and beliefs regarding heart disease and heart health; (3) motivations, barriers, and preferences related to seeking health information or care	<ul style="list-style-type: none"> □ Women □ Aged 25 years or older 	<ul style="list-style-type: none"> □ Actual knowledge about risk factors and common symptoms of heart disease □ Perceived level of heart disease knowledge, assessed by asking: “<i>How informed would you say that you are about heart health and heart disease and the risk factors associated with it?</i>” □ Attitudes, perceptions, and beliefs about heart disease and heart health □ Motivations, barriers, and preferences to seeking health information or care 	<ul style="list-style-type: none"> □ In the actual knowledge response, most participants had a medium level (46.0%), high level (27.8%) and low level (26.2%) of knowledge □ In the perceived knowledge response, most participants (48.0%) were moderately informed about heart disease, heart health, and the risk factors associated with it. Meanwhile, 9% and 43% of the participants were not informed and well informed, respectively □ 55% of the participants routinely discuss prevention and lifestyle practices with their health care provider □ Most participants believe that leading a healthy heart lifestyle is important □ The reasons for the participants' motivation to improve their health: to feel better (92%), to live longer (82%), and to avoid taking medications (74%)
6	Mohan et al [19]	To assess the knowledge about healthy heart habits in urban and rural population after SMS campaign	<ul style="list-style-type: none"> □ Men and women □ Aged > 18 years □ Urban and rural population 	Knowledge of healthy heart habit after received health education messages	Most participants were able to retain knowledge about many components of healthy heart behaviors delivered through SMS, except for issues such as foods to avoid, target for normal blood pressure, and measures to take before blood pressure measurement
7	Mooney &	To evaluate the effects of a	<ul style="list-style-type: none"> □ Men and women 	<ul style="list-style-type: none"> □ Knowledge of CHD risk 	<ul style="list-style-type: none"> □ Participant's knowledge of CHD risk factors

No	Authors	Study objective	Sample characteristics	Measurements	Findings
	Franks [20]	community health screening and education intervention on knowledge of CHD risk factors	<ul style="list-style-type: none"> □ Aged 18 years or older □ All races/ethnicities 	<ul style="list-style-type: none"> □ factors □ Pre- and post-screening health-promoting behaviors 	<ul style="list-style-type: none"> □ improves as a result of a pharmacist-led health screening and education intervention □ Post-screening knowledge of healthy values for CHD risk variables, such as blood pressure (P=0.02), fasting blood glucose (P=0.03), fasting total cholesterol (P<0.01), and BMI (P<0.01), was considerably higher than pre-screening knowledge □ 46.7% of the participants made multiple behavior changes, while 22.2% reported making only one
8	Dalusung-Angosta [21]	To examine the baseline knowledge and risk factors of CHD among Filipino-Americans and to identify the predictors of CHD knowledge	<ul style="list-style-type: none"> □ Men and women □ Aged 35 to 37 years 	<ul style="list-style-type: none"> □ Knowledge of CHD risk factors □ Predictors of CHD knowledge 	<ul style="list-style-type: none"> □ Most participants scored well on the CHD knowledge test based on their mean score □ 40% of the participants were unaware that control of diabetes can lower CHD risk; 41% were unaware that abdominal obesity was a risk factor for heart disease; and only half of the participants answered correctly the question "<i>If your good cholesterol (HDL) is high, you are at risk for heart disease.</i>" □ Gender and education are believed to be significant predictors of CHD knowledge
9	Crouch & Wilson [22]	To assess the knowledge of rural women about heart disease and to assess whether increased knowledge was associated with healthier lifestyle behaviors and a reduction in CHD risk	<ul style="list-style-type: none"> □ Women □ Aged 25 to 65 years □ Visiting women's health clinic 	Knowledge level and risk of heart disease	<ul style="list-style-type: none"> □ The participants had a reasonable knowledge of CHD (mean, 84%; SD, 9.94) and overall, their knowledge of heart disease is quite good, although knowledge of cholesterol and diabetes is still lacking □ Women may be aware of heart disease risk factors, but they unaware of their vulnerability to heart disease in relation to their lifestyle habits □ 34.4% of the participants had two risk factors for CHD; 21.9% had one risk factor; 15.6% had three risk factors; 7.8% had four risk factors; and the remaining had none
10	Akintunde et al [23]	To determine the level of awareness and knowledge of heart disease risk factors	<ul style="list-style-type: none"> □ Men and women □ The age requirement is not specifically 	The level of awareness and knowledge of heart disease risk factors	<ul style="list-style-type: none"> □ The level of awareness and knowledge of heart disease risk factors among university workers in Nigeria is low

No	Authors	Study objective	Sample characteristics	Measurements	Findings
		among adult university workers in Nigeria	mentioned □ Nigeria population		□ About half of the participants had low level of knowledge (49.0%), the remaining with moderate level of knowledge (31.1%) and with good level of knowledge (19.9%)
11	Pandey & Khadka [24]	To identify the knowledge on heart disease and its prevention among the adult population residing in Ddhikot Village Development Committee (VDC) of Bhaktapur district	□ Men and women □ Aged 19 to 65 years □ Residing in Bhaktapur district	Knowledge regarding modifiable and nonmodifiable risk factors, symptoms and preventive measures for heart disease	□ 42.2% of the participants had inadequate knowledge of heart disease □ Age is the most commonly recognized nonmodifiable risk factor for heart disease (46.9%), while the modifiable risk factor is consumption of fatty foods (72.6%) □ 68% of the participants agree that heart disease can be prevented □ Regarding symptoms and preventive measures, the answers that most participants chose were shortness of breath during exertion (57.8%) & decreasing fatty diet and having a balanced diet (80.7%)
12	Al Khayyal et al [25]	To assess and determine the relations among elder's knowledge about risk factors, perception of risk, and adopted preventive behaviors of CHD	□ Men and women □ Aged 60 years or older □ No history of CHD or its sequels (angina and MI)	□ Knowledge about risk factors, risk perception, and CHD preventive behaviors □ The influence of CHD risk factors and risk perceptions on CHD prevention behavior	□ The elderly's knowledge of CHD risk factors, their perception of risk, and their adoption of preventive behaviors were generally poor □ Knowledge about CHD risk factors and risk perception affected the positive commitment of the elderly to the preventive behaviors of CHD
13	Winham & Jones [26]	To determine the level of knowledge of lifestyle risk factors for CVD among young African American adults in Phoenix	□ Men and women □ Aged 18 to 26 years	□ Knowledge of risk factors for heart disease □ Knowledge of the symptoms and outcomes of heart disease	□ Young adult African Americans are familiar with some aspects of cardiac disease. However, participants' knowledge of other significant risk factors and preventive behaviors was more diverse and inconsistent □ Men and college-educated participants were more knowledgeable of many risk factors and preventive strategies than their counterparts
14	S et al [27]	To identify people's knowledge about CHD, their attitude towards prevention and main risk reduction barriers	□ Men and women □ Aged 18 years or older □ Attending family health clinic	□ Knowledge about CHD □ Participants' attitudes towards prevention of CHD □ Risk reduction barriers	□ The total knowledge of CHD was satisfactory but lower than the total attitude □ Most participants had a positive attitude towards all preventive measures □ Medical setting barriers (24%) are the most common barrier to risk reduction, followed by

No	Authors	Study objective	Sample characteristics	Measurements	Findings
15	Jamaludin et al [28]	To determine the level of knowledge, awareness, and perception about CHD symptoms and risk factors among residents in Kuantan, Pahang	<ul style="list-style-type: none"> □ Men and women □ Aged 18 to 60 years □ Able to read and write in English or Malay 	Knowledge, awareness, and perception about CHD symptoms and risk factors of CHD	<p>patient-related barriers (22.4%), and systemic and organizational barrier (9.6%)</p> <ul style="list-style-type: none"> □ Most participants had high knowledge, poor awareness and poor perception of CHD □ The most commonly recognize of CHD symptom is chest discomfort (92.5%) □ The most commonly recognize of CHD risk factor is high blood cholesterol (91%)

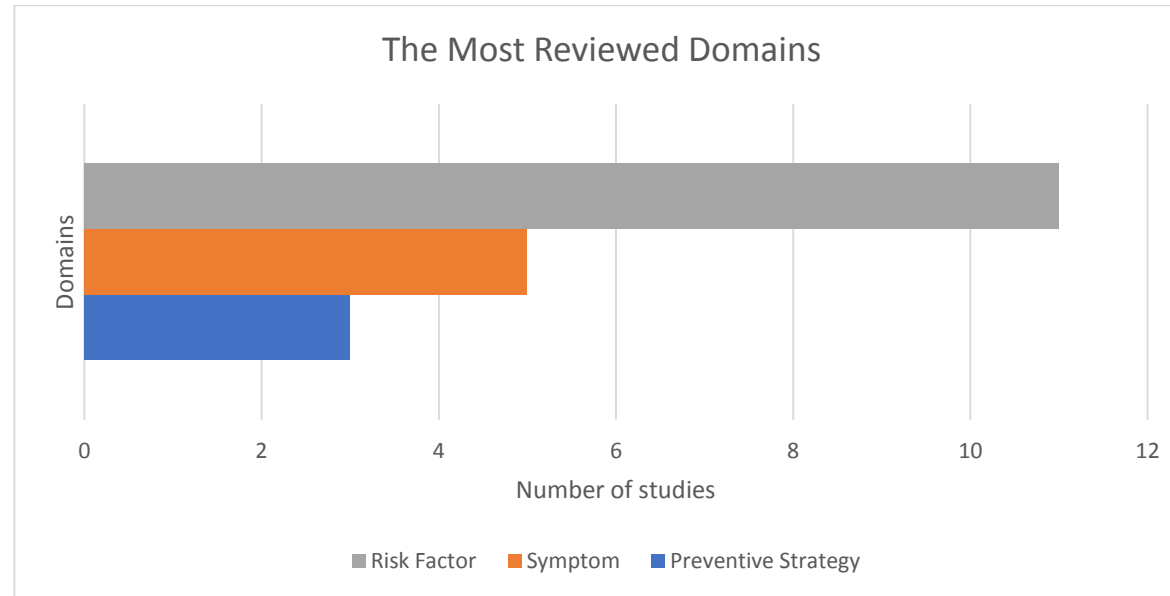


Fig. 2. The most reviewed domains

The results showed that the participants were able to maintain knowledge of many aspects of healthy heart habits after receiving health messages by SMS for a period of 6 months. Another study that also used interventions showed an increase in participants' knowledge after health screening and educational interventions by pharmacists [20]. Among post-PCI patients, the level of knowledge and awareness was poor and unrelated to their risk factor profile [15]. Most of them believed that CHD was no longer a worry after PCI, and other results showed that knowledge levels are not influenced by risk factors. PCI is a minimally invasive nonsurgical therapy aimed at reducing coronary artery constriction or blockage and increasing blood flow to ischemic tissue [30].

This study had several limitations, such as only publications in English were considered, leaving out a significant portion of the literature written in other languages. In addition, the number of studies included in this review was small, and the comparability between the studies was inadequate, so that limited the generalizability of the findings. Moreover, the sample size of the studies included in this review was averagely small, so that it less represents the level of awareness and knowledge of the respondents in the country concerned.

Despite these limitations, our study provided a systematic summary of research on awareness and knowledge of coronary heart disease in the general population. Risk factors, symptoms, and preventive strategies are the three domains that are mostly reviewed (Fig. 2). Further, there is not a lot of research found on these topics that includes measurements obtained before and after the intervention.

4. CONCLUSION

Our findings showed that most of the participants in the studies had low knowledge and awareness of CHD and its risk factors, and overall, the studies reported various results. Several studies have reported that awareness and knowledge of CHD and its risk factors are influenced by some factors such as age, gender, and level of education. One study reported that race, marital status, family history of CHD, and risk factor profile are also the influencing factors. An important finding from this result is that although digital media currently seems to dominate, most people have not utilized it optimally to access health information independently. Therefore,

providing health information by healthcare professionals as trusted information givers is still needed, in order to improve awareness and knowledge among participants.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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