

The Relationship Between Education Level and Public Knowledge Regarding Heart Attacks

Vincencius Surani¹, Lilik Pranata^{2*}, Bangun Dwi Hardika³

^{1,2,3}Universitas Katolik Musi Charitas, Palembang, Indonesia

Corresponding Author: lilikpranataukmc@gmail.com

ABSTRACT

Purpose A heart attack is a medical emergency requiring symptom recognition and immediate intervention. Public knowledge is essential for identifying warning signs and determining appropriate responses. This study examines the relationship between education level and public knowledge regarding heart attacks. **Design Methodology Approach** This study uses a quantitative correlational design involving thirty respondents selected through consecutive sampling. Data were collected using a questionnaire. Respondent characteristics and knowledge levels were analyzed descriptively, while the relationship between education level and knowledge was examined using Spearman's rho correlation test. **Findings** The statistical analysis yielded a significance value of zero point two hundred forty, exceeding zero point zero five, with a correlation coefficient of zero point two hundred seven, indicating a very weak positive association. The coefficient of determination was zero point zero four two, equivalent to four point two percent. The results indicate no statistically significant relationship between education level and public knowledge regarding heart attacks. **Research Implications** Formal education does not significantly correlate with public knowledge regarding heart attacks. Future research should investigate other factors, including healthcare exposure and media access, using larger and more representative community samples to evaluate cardiovascular health interventions. **Practical Implications** Healthcare institutions and public health workers should provide continuous education about heart attack symptoms, modifiable risk factors, and emergency responses. Community programs should use accessible materials and practical methods to improve awareness and support timely decision making during cardiac emergencies. **Originality Value** This study provides empirical evidence from a local Indonesian community, challenging the assumption that higher formal education guarantees cardiovascular literacy. The findings emphasize the importance of assessing community knowledge directly to improve emergency health awareness. **Keywords** Education Level, Public Knowledge, Heart Attack, Cardiovascular Health, Health Education

Keywords: Education Level, Public Knowledge, Heart Attack, Cardiovascular Health, Health Education

1. INTRODUCTION

Cardiovascular disease is a leading cause of death worldwide and poses a significant challenge to healthcare systems. The World Health Organization (WHO) reported that approximately 19.8 million people died from cardiovascular disease in 2022, accounting for about 32% of all global deaths. The majority of these deaths are caused by heart attacks and strokes, with a disproportionately higher burden in low- and middle-income countries (World Health Organization, 2025a). This situation underscores that the prevention of cardiovascular disease depends not only on the availability of medical services

but also on the public's ability to recognize health risks and make appropriate decisions when faced with emergency symptoms.

A heart attack, or acute myocardial infarction (AMI), is an acute condition that occurs when blood flow to the heart muscle is interrupted, leading to damage to the myocardial tissue. This condition requires immediate medical intervention to limit damage to the heart muscle and reduce the risk of complications or death. Delays in recognizing symptoms and seeking assistance can prolong the time before a patient receives necessary care. Therefore, public knowledge regarding heart attacks is a crucial component in enhancing preparedness for cardiovascular emergencies (World Health Organization, 2025a; Ma et al., 2021).

Symptoms of a heart attack may include chest pain or discomfort, shortness of breath, pain radiating to the arms, shoulders, back, neck, or jaw, as well as cold sweats, nausea, dizziness, and unusual weakness. However, the symptoms experienced can vary from person to person. Some individuals may experience less typical symptoms, which can lead to the condition not being immediately recognized as a heart attack. A systematic review and meta-analysis by Sharma et al. (2021) on public awareness of myocardial infarction symptoms indicates that the recognition of these symptoms remains inconsistent across the population. Chest pain is relatively better recognized than other symptoms, such as pain in the jaw, back, or neck. These findings suggest that while people may be aware of certain symptoms, they often lack a comprehensive understanding of the full range of heart attack manifestations.

Knowledge about heart attacks encompasses more than just recognizing symptoms; it also includes understanding risk factors, prevention strategies, and the appropriate actions to take when symptoms arise. Modifiable risk factors include hypertension, diabetes mellitus, dyslipidemia, smoking, an unhealthy diet, physical inactivity, and being overweight. Adequate knowledge can help individuals grasp the importance of managing these risk factors and undergoing regular health check-ups. Furthermore, it is crucial for the public to understand that a suspected heart attack is a medical emergency requiring immediate professional care, rather than something that can be managed independently at home.

A study by Liu et al. (2022) involving 4,122 community residents in Tianjin, China, found that 62.7% of respondents possessed a high level of knowledge regarding the symptoms of an acute myocardial infarction (AMI), while 39.5% demonstrated a high level of knowledge concerning modifiable risk factors. The study also indicated that higher levels of education are associated with a greater likelihood of having good knowledge. Beyond education, factors such as household income, health insurance coverage, regular health check-ups, medical history, and exposure to public health education are also linked to one's level of knowledge. These results underscore the importance of considering education level as a key factor related to public awareness of heart attacks.

Similar findings were reported by Pallangyo et al. (2024) in a study conducted among the public in Dar es Salaam, Tanzania. The research revealed that public knowledge regarding the risk factors and warning signs of heart attacks and strokes remains limited. In the study's preliminary analysis, a higher level of education was identified as a characteristic associated with greater knowledge. These results suggest that improving education and providing easily understandable health information are essential aspects of efforts to raise public awareness. However, differences in population characteristics, education systems, and access to healthcare services mean that research findings from one region cannot be directly generalized to another.

The level of formal education has the potential to influence health-related knowledge by affecting an individual's ability to read, comprehend information, evaluate sources, and apply that information in daily life. Individuals with higher levels of education may have a greater capacity to understand medical terminology, access scientific information, and recognize disease risk factors. Conversely, individuals

2. LITERATURE REVIEW / THEORETICAL FRAMEWORK

A. Concept of Acute Myocardial Infarction (AMI)

Acute Myocardial Infarction (AMI), commonly known as a heart attack, is an acute medical emergency resulting from impaired blood flow to the heart muscle, leading to myocardial tissue necrosis. According to the World Health Organization (WHO), cardiovascular diseases (CVDs) remain the leading cause of global mortality, accounting for approximately 19.8 million deaths annually (about 32% of all global deaths), mostly caused by heart attacks and strokes. Early symptom recognition is essential to avoid pre-hospital delays. While chest pain or discomfort is the classic hallmark symptom, atypical manifestations such as shortness of breath, nausea, dizziness, cold sweats, and pain radiating to the jaw, neck, back, or arms are frequently overlooked.

B. Concept of Cardiovascular Health Knowledge

Public awareness regarding heart attacks encompasses a comprehensive understanding of: Basic definitions and disease mechanisms. Warning signs and symptoms (typical and atypical). Modifiable risk factors (e.g., hypertension, diabetes mellitus, dyslipidemia, smoking, unhealthy diet, physical inactivity, and obesity). Preventive measures and lifestyle modifications. Immediate emergency response protocols (calling emergency services rather than relying on home remedies).

C. Concept of Formal Educational Attainment

Higher formal education levels (primary, secondary, or tertiary) potentially enhance health knowledge by building cognitive capabilities such as processing complex medical jargon, searching for reliable sources, and evaluating health information. However, formal schooling is not the sole determinant of health literacy; personal health experiences, family medical history, and exposure to public health campaigns also shape individual health comprehension.

D. Health Literacy Framework

The relationship between formal schooling and health awareness is conceptualized through the Health Literacy Framework formulated by the WHO. Health literacy is defined as an individual's ability to obtain, process, understand, and apply health information to make informed healthcare decisions.

While formal education serves as an enabling factor for health literacy, it cannot be used as a direct proxy for specific cardiovascular disease knowledge.

3. RESEARCH METHOD

This study employs a quantitative, correlational design with an analytical observational approach and a cross-sectional framework. This design is used to analyze the relationship between the level of education and public knowledge regarding heart attacks. Measurements for both the education level and knowledge variables were conducted during the same data collection period, without any intervention applied to the respondents. While this design allows for the identification of a relationship between the two variables, it cannot be used to infer a causal relationship.

The target population for this study consists of adults residing in the Sukabangun area. The accessible population comprises individuals who meet the study's criteria and are reachable during the data collection period. The sample was selected using a non-probability sampling technique, specifically consecutive sampling. Inclusion criteria are: (1) being at least 18 years old; (2) residing in the study area; (3) being able to understand the language used in the questionnaire; and (4) being willing to participate by providing informed consent after receiving an explanation of the study. Exclusion criteria include respondents who failed to complete the research instrument or whose primary data remained incomplete. The final sample size analyzed was 30 individuals.

The independent variable in this study is the highest level of formal education completed by the respondent. Education levels are categorized according to the prevailing educational system: higher education, secondary education, and primary education. The dependent variable is public knowledge regarding heart attacks. This knowledge encompasses an understanding of the definition of a heart attack, its symptoms and warning signs, risk factors, prevention methods, and appropriate initial actions to take when a heart attack is suspected.

Data were collected using a structured questionnaire consisting of two sections. The first section covers respondent characteristics, including age, gender, occupation, and the highest level of formal education completed. The second section assesses knowledge about heart attacks through questions concerning their definition, symptoms, risk factors, prevention, and the actions to be taken when symptoms arise. Each response in the knowledge section is scored based on a predetermined answer key. For true/false questions, a correct answer is assigned a score of 1, while an incorrect or "don't know" response is assigned a score of 0. The total score is calculated by summing the scores for all items and converting the result into a percentage of the maximum possible score.

The knowledge questionnaire was developed by the researchers, following validity and reliability testing. Validity was assessed using the Content Validity Index (CVI), with three nurses evaluating each questionnaire item. The CVI for the knowledge questionnaire was 0.91, indicating that the instrument is valid (> 0.90). Reliability was assessed using Cronbach's alpha, which yielded a value of 0.63, indicating that the questionnaire is reliable (> 0.60).

Data collection took place after potential respondents were provided with an explanation regarding the study's objectives, procedures, benefits, potential discomforts, data confidentiality, and their right to decline participation or withdraw at any time without consequence. Respondents who agreed to participate provided informed consent. The questionnaires were then completed independently by the respondents. The collected data were checked for completeness, coded, and entered into statistical software for analysis.

Data analysis was conducted in stages using the statistical software Jamovi. Univariate analysis was employed to describe respondent characteristics, educational attainment, and knowledge levels. Categorical data are presented as frequencies and percentages. Numerical data, such as age, are reported using the median, as the distribution was non-normal. Bivariate analysis was performed to examine the relationship between educational attainment and public knowledge regarding heart attacks, using the Spearman's rho test. All statistical tests were two-tailed, with a significance level set at 5% ($p < 0.05$). Results are reported alongside effect sizes and 95% confidence intervals. If the p -value < 0.05 then there is a relationship between the level of education and people's knowledge about heart attacks, conversely if the p -value > 0.05 then there is no relationship between the level of education and people's knowledge about heart attacks.

4. RESULTS

The research results, based on a univariate analysis, include the presentation of data on the respondents' age, gender, marital status, education level, occupation, and knowledge regarding heart attacks. Since the age data is measured on a ratio scale, a normality test was conducted; the results are shown in Table 1 below:

Table 1. Results of Normality Test for Age

Category	Shapiro-Wilk p
Respondent age	$< 0,001$

Based on Table 1 above, the normality test results for age indicate that the age data are not normally distributed ($p < 0.05$); therefore, the age data are presented as median, minimum, and maximum values, as shown in Table 2 below:

Table 2. Frequency Distribution of Respondents' Age

Median	Usia Minimum	Usia Maksimum
20,5	18	61

Based on Table 2 above, the median age of the respondents is 20.5 years, with the youngest respondent being 18 years old and the oldest being 61 years old.

The frequency distribution for gender, marital status, education level, occupation, and the respondents' knowledge regarding heart attacks is presented in Table 3 below:

Table 3. Frequency Distribution of Respondent Categorical Data

No.	Category	Frequency	Percentage
1.	Gender:		
	Male	13	43,3%
	Female	17	56,7%
	Total	30	100%
2.	Marital Status:		
	Married	13	43,3%
	Unmarried	17	56,7%
	Total	30	100%
3.	Education Level:		
	Higher Education	22	73,3%
	Secondary Education (High School)	8	26,7%
	Total	30	100%
4.	Occupation:		
	Retired	2	6,7%
	Civil Servant	1	3,3%
	Self-employed	27	90,0%
	Total	30	100%
5.	Knowledge:		
	Good	4	13,3%
	Enough	18	60,0%
	Not enough	8	26,7%
	Total	30	100%

Based on Table 3 above, the majority of respondents are female ($n=17$; 56.7%), while 13 respondents (43.3%) are male. Regarding marital status, the majority of respondents are unmarried ($n=17$; 56.7%), and 13 respondents (43.3%) are married. In terms of educational attainment, the majority of respondents are higher education graduates ($n=22$; 73.3%), while 8 respondents (26.7%) are secondary education (high school) graduates. As for the frequency distribution of the respondents' knowledge regarding heart attacks, the majority fall into the "sufficient" category ($n=18$; 60.0%), followed by 8 respondents (26.7%) with "insufficient" knowledge, and 4 respondents (13.3%) with "good" knowledge.

The research results, based on a bivariate analysis, present a statistical test using Spearman's rho to determine whether there is a relationship between the respondents' education level and their knowledge regarding heart attacks, as shown in Table 4 below:

Table 4. Spearman Rho Test Results

Last education	Respondent Knowledge	
	Spearman's rho	0,120
	df	28
	p-value	0,529

Based on Table 4 above, the Spearman's rho correlation test results show a correlation coefficient (rho) of 0.120, with a p-value of 0.529 and $df = 28$. A p-value > 0.05 indicates that there is no statistically significant relationship between education level and public knowledge regarding heart attacks. The correlation coefficient of 0.120 suggests a positive relationship of very weak strength. The positive direction indicates that higher education levels tend to be associated with greater knowledge; however, this trend is not statistically significant. Consequently, this study has not found sufficient

evidence to establish a relationship between education level and public knowledge regarding heart attacks.

The results of the bivariate analysis above are further supported by the cross-tabulation data between education level and respondents' knowledge, as presented in Table 5 below:

Table 5. Cross-tabulation of Education and Knowledge

Education	Knowledge			Total
	Poor	Fair	Good	
Higher education	6 (20,0%)	14 (46,6%)	2 (6,6%)	22 (73,3%)
Senior Education (SMA)	2 (6,7%)	4 (13,3%)	2 (6,6%)	8 (26,7%)
Total	8 (26,7%)	18 (60,0%)	4 (13,3%)	30 (100%)

Table 5 above shows that there are still respondents with a higher education background who possess limited knowledge about heart attacks specifically, 6 respondents with poor knowledge and 14 respondents with fair knowledge.

5. DISCUSSION

The research results indicate that the majority of respondents are female ($n=17$; 56.7%), while 13 respondents (43.3%) are male. Regarding marital status, the majority are unmarried ($n=17$; 56.7%), whereas 13 respondents (43.3%) are married. In terms of educational attainment, the majority of respondents ($n=22$; 73.3%) hold a higher education degree, while 8 respondents (26.7%) have completed secondary education (high school).

These characteristics show that the study participants are predominantly individuals with higher education. Nevertheless, formal education does not always guarantee a sound understanding of specific health issues. Knowledge regarding heart attacks is also influenced by exposure to information, personal or family experience, access to healthcare services, and the ability to comprehend health-related information. Therefore, one's level of formal education should be distinguished from specific knowledge concerning the symptoms, risk factors, prevention, and initial response measures for a heart attack.

A study by Pallangyo et al. (2024) conducted among the general public in Tanzania found that knowledge regarding the risk factors and warning signs of heart attacks and strokes remains inadequate. Although most respondents had received formal education, many were unable to accurately identify the warning signs. The study also identified a correlation between educational attainment and knowledge through bivariate analysis. These findings suggest that while formal education may contribute to health literacy, the actual level of public knowledge still requires direct assessment.

The distribution of knowledge levels in this study shows that 18 respondents (60.0%) possess "sufficient" knowledge, 8 respondents (26.7%) have "insufficient" knowledge, and only 4 respondents (13.3%) demonstrate "good" knowledge. These results indicate that the majority of respondents have not reached the "good" knowledge category. This situation warrants attention, as the ability to recognize the signs of a heart attack can influence an individual's decision to seek immediate medical assistance.

Knowledge regarding heart attacks should encompass more than just the awareness of chest pain. The public should be aware that a heart attack can also be accompanied by shortness of breath, cold sweats, nausea, or pain that radiates to the arms, jaw, neck, or back. A study by Abdelkhalik et al. (2024) involving 401 high school students in Lebanon found that, prior to an educational video intervention, only 22% of participants possessed adequate knowledge regarding the symptoms of a heart attack. Following the educational intervention, the proportion of participants with adequate knowledge increased to 83.2%. These findings underscore the importance of structured education in strengthening the understanding of heart attack symptoms.

Similar findings were reported by Sajja et al. (2023) in a study of 200 individuals in Georgia, United States, which evaluated public knowledge about heart attacks. The study indicated that public understanding of heart attacks remains an area requiring attention. Meanwhile, a study conducted

among the general public and outpatients in Botswana by Ookeditse et al. (2024) also assessed knowledge regarding the symptoms and risk factors of myocardial infarction, as well as their associations with social and behavioral characteristics. Both studies support the necessity of conducting specific assessments of knowledge, rather than merely estimating it based on an individual's level of education.

The results of the Spearman's rho correlation test yielded a correlation coefficient of 0.120, with a p-value of 0.529, based on a sample of 30 respondents. This coefficient indicates a positive relationship of very weak strength. In other words, within this research sample, there is a tendency for higher levels of education to be associated with greater knowledge, though this tendency is extremely slight. A p-value greater than 0.05 indicates that the relationship is not statistically significant.

Consequently, this study has not found sufficient evidence to establish a relationship between education level and public knowledge regarding heart attacks. These results should not be interpreted to mean that education plays no role whatsoever in health-related knowledge. A more accurate interpretation is that the relationship observed within this sample is not sufficiently strong to be considered statistically significant. The results of this study differ from those of Pallangyo et al. (2024), who reported a link between education level and knowledge regarding risk factors and warning signs of heart attacks and strokes. Research on community-level knowledge, attitudes, and practices regarding cardiovascular diseases and modifiable risk factors in India also found that knowledge about the symptoms of cardiovascular disease tends to be lower among groups with lower levels of education.

6. CONCLUSION

The majority of respondents (18 individuals, 60.0%) possess a sufficient level of knowledge regarding heart attacks. The Spearman's rho test indicates a very weak positive correlation between education level and knowledge (0.120), which is not statistically significant (0.529). Consequently, this study has not found sufficient evidence to establish a link between education level and public knowledge concerning heart attacks. Ongoing health education is essential to improve public understanding of the symptoms, risk factors, and initial actions to take in the event of a heart attack. Recommendations for the research setting: It is suggested that health education for the public—covering symptoms, risk factors, prevention, and initial responses to heart attacks be enhanced through outreach programs and the use of easily understood educational materials. For future researchers: It is recommended to include a larger sample size, expand the geographical scope of the study, and examine other factors that may influence knowledge about heart attacks, such as exposure to health-related information, personal or family experience with the condition, and access to health education.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

REFERENCES

- Sehgal, A., Mittal, V. and Kaur, A. 'A descriptive cross-sectional study to evaluate the knowledge about symptoms and risk factors for heart attack (myocardial infarction) among the general population of New Delhi' (2023), *IAR Journal of Anaesthesiology and Critical Care*, 4(1), pp. 1–3. Available at: <https://doi.org/10.47310/iarjacc.2023.v04i01.013>.
- Bray, J.E., Nehme, Z., Finn, J.C., Kasza, J., Clark, R.A., Stub, D., Cadilhac, D.A., Buttery, A.K., Woods, J., Kim, J., Smith, B.J., Smith, K., Cartledge, S., Beauchamp, A., Dodge, N., Walker, T., Flemming-Judge, E., Chow, C., Stewart, M., Cox, N., and Gaal, W., Nadurata, P.C. 'A protocol for the Heart Matters stepped wedge cluster randomised trial:

- the effectiveness of heart attack education in regions at highest-risk' (2023), *Resuscitation Plus*, 15, 100431. Available at: <https://doi.org/10.1016/j.resplu.2023.100431>.
- Fukuoka, Y., Kim, D.D., Zhang, J., Hoffman, T.J., DeVon, H.A. and Sagae, K. 'AI HeartBot to increase women's awareness and knowledge of heart attacks: nonrandomized, quasi-experimental study' (2025), *JMIR Cardio*, 9. Available at: <https://doi.org/10.2196/80407>.
- Lee, C., Chow, C., Yan, A.T., Moe, G.W., Tu, J.V., and Chu, J.Y. 'Awareness of warning symptoms of heart disease and stroke: results of a follow-up study of the Chinese Canadian Cardiovascular Health Project' (2021), *CJC Open*, 3(6), pp. 741–750. Available at: <https://doi.org/10.1016/j.cjco.2021.01.014>.
- Abdelkhalik, M.A., Boutros, E., Trad, K., Arafat, O., Alyousfi, M.N. and Bouclaous, C.B. (2024) 'Moving towards health promoting schools: effectiveness of an educational intervention to improve knowledge, attitude and beliefs regarding heart attack, and CPR knowledge in high school students in Lebanon', *Frontiers in Public Health*, 12, 1355766. Available at: <https://doi.org/10.3389/fpubh.2024.1355766>.
- Banharak, S., Threeranut, A. and Metprommarat, A. (2024) 'Effects of health education applying role play on decision making in acute myocardial infarction situation among older adults in community', *Scientific Reports*, 14, 19627. Available at: <https://doi.org/10.1038/s41598-024-70747-2>.
- Singh, K., Kondal, D., Mohan, D., Gandral, M., Rajan, S., Mohan, V., Ali, M.K., Narayan, K.V., Huffman, M.D., Prabhakaran, D., and Tandon, N. 'Community-level knowledge, attitudes, and practices regarding cardiovascular diseases and modifiable risk factors in India' (2024), *Indian Heart Journal*, 76(6), pp. 376–384. Available at: <https://doi.org/10.1016/j.ihj.2024.11.002>.
- Dewi, P., Tasminatun, S. and Himawan, W. (2025) 'Health promotion intervention to improve public knowledge on coronary heart disease in Yogyakarta, Indonesia: a quasi-experimental study', *The Open Cardiovascular Medicine Journal*, 19, e18741924364505. Available at: <https://doi.org/10.2174/0118741924364505250115101701>.
- Muhihi, A., Njelekela, M.A., Anaali, A., Mruma, H.A., Sunguya, B., Kakoko, D., Kessy, A.T., Mpembeni, R., and Urassa, D.P. 'Enhancing public knowledge of risk factors and warning signs for stroke and heart attack through home-based community health worker interventions: a cluster randomized trial' (2025).
- Hassan, M.O., Ahmed, S.A., Hassan, M.S., Mohamud, M.A. and Abdi, A.E. (2024) 'Exploring myocardial infarction knowledge, attitudes and practice among Mogadishu's Somali residents', *Vascular Health and Risk Management*, 20, pp. 13–20. Available at: <https://doi.org/10.2147/VHRM.S448220>.
- Yousef, F., Mohamed, Z., Singh, G.K.J., and Hassan, N.H. 'Identifying educational needs and knowledge gaps in healthcare professionals for effective management of acute myocardial infarction' (2024), *International Journal of Advanced and Applied Sciences*, 11(6).
- Winiger, A.M., Shue-McGuffin, K., Moore-Gibbs, A., Jordan, K., and Blanchard, A. 'Implementation of an Ask Me 3® education video to improve outcomes in post-myocardial infarction patients' (2021), *American Journal of Preventive Cardiology*, 8, 100253. Available at: <https://doi.org/10.1016/j.ajpc.2021.100253>.
- Jirapraditpon, S. (2024) 'Effects of health education on knowledge and practices for preventing acute myocardial infarction in patients with acute myocardial infarction in Koh Samui Hospital', *Journal of MCU Nakhondhat*.



- Kartschmit, N., Birnbach, B., Hartwig, S. and Mikolajczyk, R. (2022) 'Knowledge of symptoms of acute myocardial infarction, reaction to the symptoms, and ability to perform cardiopulmonary resuscitation: results from a cross-sectional survey in four regions in Germany', *Frontiers in Cardiovascular Medicine*, 9, 897263. Available at: <https://doi.org/10.3389/fcvm.2022.897263>.
- Harbi, K.M.A., Alluhidan, W.A., Almatroudi, M.I., and Alotabi, N.M. 'Knowledge and attitude of general people towards symptoms of heart attack and the impact of delay time in Riyadh, Saudi Arabia' (2022). Available at: <https://pmc.ncbi.nlm.nih.gov/articles/PMC9767791/>.
- Liu, Y. et al. (2022) 'Latent class cluster analysis of knowledge on acute myocardial infarction in community residents: a cross-sectional study in Tianjin, China', *BMJ Open*, 12(6), e051952. Available at: <https://doi.org/10.1136/bmjopen-2021-051952>.
- Luan, S. et al. (2021) 'Public knowledge of stroke and heart attack symptoms in China: a cross-sectional survey', *BMJ Open*, 11(1), e043220. Available at: <https://bmjopen.bmj.com/content/11/1/e043220>.
- Ma, J. et al. (2021) 'Public awareness of acute myocardial infarction symptoms and emergency response in community residents', *European Heart Journal*, 42(Supplement 1), ehab724.3133. Available at: <https://doi.org/10.1093/eurheartj/ehab724.3133>.
- Ookeditse, O. et al. (2024) 'Age and healthy lifestyle behavior's disparities and similarities on knowledge of myocardial infarction symptoms and risk factors among public and outpatients in a resource-limited setting, cross-sectional study in greater Gaborone, Botswana', *BMC Cardiovascular Disorders*, 24, 140. Available at: <https://doi.org/10.1186/s12872-024-03792-4>.
- Pallangyo, P., Mkojera, Z.S., Komba, M. et al. (2024) 'Public knowledge of risk factors and warning signs of heart attack and stroke', *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery*, 60, 12. Available at: <https://doi.org/10.1186/s41983-023-00780-x>.
- Risnandar, M.W., Anna, A. and Mirwanti, R. (2024) 'Improving public's knowledge of cardiovascular health through health education', *Media Karya Kesehatan*, 7(2). Available at: <https://jurnal.unpad.ac.id/mkk/article/view/52885>.
- Sajja, S., Stead, T., Mangal, R. and Ganti, L. (2023) 'Layperson knowledge of heart attacks in the state of Georgia, USA', *Health Psychology Research*, 11, 77759. Available at: <https://doi.org/10.52965/001c.77759>.
- Sehgal, A., Mittal, V. and Kaur, A. (2023) 'A descriptive cross-sectional study to evaluate the knowledge about symptoms and risk factors for heart attack (myocardial infarction) among the general population of New Delhi', *IAR Journal of Anaesthesiology and Critical Care*, 4(1), pp. 1–3. Available at: <https://doi.org/10.47310/iarjacc.2023.v04i01.013>.
- Shams, A., Ibrahim, I. and Ahmadzai, H. (2024) 'Awareness of myocardial infarction in Nangarhar residents: a community based study', *Journal of Cardiology and Cardiovascular Medicine*, 9(2), pp. 130–134. Available at: <https://doi.org/10.29328/journal.jccm.1001193>.
- Sharma, A. et al. (2021) 'Global awareness of myocardial infarction symptoms in general population: a systematic review and meta-analysis', *Korean Circulation Journal*, 51(12), pp. 983–996. Available at: <https://doi.org/10.4070/kcj.2021.0100>. Full text gratis:
- Syed, W., Samarkandi, O., Alanazi, A.A. et al. (2024) 'Assessment of myocardial infarctions knowledge, attitudes and beliefs among adults living in Riyadh Saudi Arabia – insights from cross-sectional study', *Scientific Reports*, 14, 31457. Available at: <https://doi.org/10.1038/s41598-024-83169-x>.



- Hassen, H.Y., Ndejjo, R., Geertruyden, J.V., Musinguzi, G., Abrams S., and Bastianes, H. 'Type and effectiveness of community-based interventions in improving knowledge related to cardiovascular diseases and risk factors: a systematic review' (2022), *American Journal of Preventive Cardiology*, 10, 100341. Available at: <https://doi.org/10.1016/j.ajpc.2022.100341>.
- World Health Organization (2022a) *Health literacy development for the prevention and control of noncommunicable diseases: Volume 2. A globally relevant perspective*. Geneva: World Health Organization. Available at: <https://www.who.int/publications/i/item/9789240055353>.
- World Health Organization (2022b) *Health literacy development for the prevention and control of noncommunicable diseases: Volume 4. Case studies from WHO National Health Literacy Demonstration Projects*. Geneva: World Health Organization. Available at: <https://www.who.int/publications/i/item/9789240055391>.
- World Health Organization (2025a) *Cardiovascular diseases (CVDs)*. Available at: <https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-%28cvds%29>.