

Original Article

Spectrum of coronary artery disease about non-health related social risks domain

*Alam M.R.¹ Montaha S. S²

Abstract:

Background: The atherosclerotic coronary artery disease (ASCVD) is the most common cause of ischemic heart disease. The disease spectrum ranges from myocardial infarction to unstable angina and stable angina. Besides the traditional risk factors, the non-health-related social risk domains might affect the severity and outcomes of coronary artery disease. The non-health-related social risk domains like housing instability, food insecurity, transportation difficulties, utility assistance, and interpersonal safety have been considered as additional coronary artery disease risk and outcome factors. **Aim:** This research was intended to identify non-health-related social risk domains as additional coronary artery disease risk enhancers among the study population concerning outcome variables like different severity of coronary artery disease. **Methods:** A cross-sectional analytic study was conducted from January 2020 to June 2020 at Combined Military Hospital, Dhaka. A total of 100 samples were purposefully selected for this study. The individual's non-health-related social risk domains were identified and compared to the outcome of coronary artery diseases like stable angina, unstable angina, and myocardial infarction as outcome variables. The online ASCVD risk calculator and software provided by the American College of Cardiology were validated tools to estimate 10 years of ASCVD risk based on available traditional risk factors. Data were analyzed by statistical package for Social Science version 19(SPSS-19), and p-values <.05 were considered significant. **Results:** The non-health-related social risks domain, like housing problems, food insecurities, interpersonal safety threats, and bug and mold infestation, was significantly related to the higher occurrences of severe ischemic heart disease. However, transportation problems were not significantly related to severe ischemic heart disease. The occurrences of severe heart disease were significantly higher in those who had intermediate or high ASCVD scores than those who had low ASCVD scores. **Conclusion:** Some non-health-related social risks domain and high ASCVD scores are associated significantly with severe ischemic heart disease. However, a large-scale study may be carried out to validate the information from Bangladesh's perspective.

Key words: ASCVD; stable angina; unstable angina; myocardial infarction

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Introduction:

Atherosclerotic cardiovascular disease (ASCVD) is the most common cause of ischemic heart disease that might lead to stable angina, unstable angina, and myocardial infarction. ASCVD is the most common cause of death as well as imposes devastating effects on quality of life¹. World Health Organization (WHO) has estimated that 3.8 million

men and 3.4 million women have died each year since 1990 due to ASCVD. Stable angina is the less severe form of ischemic heart disease that results from myocardial ischemia due to fixed atheromatous stenosis of one or more coronary arteries. The more severe form of ischemic heart disease is unstable angina, and myocardial

Author's Affiliation:

1. *Col (Gr.Capt) Rabiul Alam, OC & President CMB Bangladesh Air Force.
2. Somaya Sidratul Montaha, Associate Professor, Obs&Gynae, ZH Sikder Women's Medical College..

Address of Correspondence: *Col (Gr.Capt) Rabiul Alam, OC & President CMB Bangladesh Air Force, Email: mtbd.dhaka@gmail.com, Mobile: 01678055103.

infarction results from myocardial ischemia/necrosis due to dynamic/acute occlusion of the coronary artery due to atheromatous plaque rupture/erosion with superimposed thrombosis.¹ Though the traditional atherosclerotic cardiovascular risk factors are the main causal factors, the non-health related social risk domains like housing instability, food insecurity, transportation difficulties, utility assistance, and interpersonal safety might affect the severity and outcome of coronary artery disease.² The ASCVD risk score is to be calculated based on different individual risk factors, and the ASCVD risk score predicts individual coronary events in the next ten years. The ASCVD risk is low when the score is less than 5%, borderline when the score is between 5%-7.4%, intermediate when the score is between 7.5%-19.9%, and high risk when the score is more than 20%.^{3,4} The individual having potentially moderate to high risk of ASCVD may benefit from intervention to reduce the risk of harm from over-treatment. This research was intended to identify prevailing non-health-related social risk domains among the study population and their 10-year ASCVD risk scores about outcome variables like stable angina, unstable angina, and myocardial infarction.

Material and Methods:

Results:

Table 1: Frequency distribution of different severity of ischemic heart disease and ASCVD Score.

Variable	Number	ASCVD risk scores		Total	P-value	χ ² value
		Intermediate	High			
SA	51	48	3	51	0.000	47.98
UA	28	2	26	49		
MI	21	12	9			

Table 1 shows the severity of ischemic heart disease in different ASCVD scores. Fifty-one participants had stable angina (SA), three of them had a high and 48 had intermediate ASCVD risk score; 28 participants developed unstable angina (UA). Among them, 26 had a high and rest 2 had an intermediate ASCVD risk score; 21 participants had a myocardial infarction (MI). Among them,

It was a cross-sectional analytic study conducted at the Combined Military Hospital in Dhaka. The enrollment period of the study was from January 2020 to June 2020, during which all the patients admitted with acute coronary syndrome except unwilling cases, primary PCI, and past CABG cases were included. A total of 100 samples were purposefully selected for this study. The individual's non-health-related social risk domains were collected by structured questionnaires provided by the Accountable Health Communities Health-Related Social Needs (AHC-HRSN). To determine the 10 years ASCVD risk scores, the relevant data were collected by investigation and questionnaire. The 10-year ASCVD risk scores were calculated using an online ASCVD risk calculator plus software provided by the American College of Cardiology. The association between categorical variables like non-health related social risk domains and ten years ASCVD risk scores were compared with outcome variables like different severity of acute coronary syndrome using a chi-square test. Descriptive statistics (Mean, standard deviations, skewness, and kurtosis) were also used to analyze the results. All data were analyzed using a statistical package for Social Science version 19(SPSS-19). All tests were two-sided, and $p < 0.05$ were considered significant.

nine had high and 12 had intermediate ASCVD risk scores. Forty-nine participants developed unstable angina and myocardial infarction (Severe heart disease); among them, 14 had an intermediate and 35 had a high ASCVD score. The difference in occurrence of non-severe heart disease (SA) and severe heart disease (UA&MI) about ASCVD score is statistically significant ($p = .000$, χ^2 value = 47.98)

Table 2: Frequency distribution of different non-medical health-related social risk domains about severe and non-severe ischemic heart disease.

Variable		Number	Severe heart disease (UA+MI)	Non severe heart disease (SA)	χ^2 value	P value
Housing problems	Yes	92	42	50	5.157	.023
	No	8	7	1		
Bug infestation	Yes	18	14	4	7.275	.007
	No	82	35	47		
Mold	Yes	13	10	3	4.66	.030
	No	87	39	48		
The oven/ stove is not working	Yes	26	12	14	.114	.735
	No	74	37	37		
Water leak	Yes	31	12	19	01.90	.167
	No	69	37	32		
Worried about last 12 months food will be run out	True	24	19	5	11.50	.000
	Not true	76	30	46		
Transportation problems in the last 12 months	Yes	48	26	22	.986	.326
	No	52	23	29		
In last 12 months, the authority threatened to cut off the line	Yes	15	14	1	13.87	.000
	No	85	35	50		
Physically hurt from anyone.	Yes	24	12	12	.013	.910
	No	76	37	39		
I got insult by anyone.	Yes	48	22	26	.370	.542
	No	52	27	25		
Threat from anyone	Yes	24	19	5	11.50	.000
	No	76	30	46		
Curse from anyone	Yes	36	17	19	.071	.789
	No	64	32	32		

Table 2 shows the relationship of non-medical health-related social domains associated with severe and non-severe ischemic heart disease, χ^2 values, and P values. Ninety-two participants had housing problems, among them 42 of whom developed severe and 50 developed non-severe ischemic heart disease, whereas 8 had no housing problems but 7 developed severe heart disease and one developed non-severe heart disease which is statistically significant ($p=0.023$, $\chi^2=5.157$).

Thirteen participants had a mold infestation, and Eighty-seven did not. Among mold infestations, ten developed severe, and 03 developed non-severe ischemic heart disease. Among non-mold infestation, 39 developed severe, and 48 developed non-severe ischemic heart disease, which is statistically significant ($p=0.030$, $\chi^2=4.66$).

Twenty-four participants were worried about food running out (food insecurity), and Seventy-six were not. Among food insecurity patients, 19 developed severe, and 05 developed non-severe ischemic heart disease. Of those who were not worried about food, 30 developed severe, and 46 developed non-severe ischemic heart disease, which is statistically highly significant ($p=0.000$, $\chi^2=11.50$).

Among the 15 participants who received the threat to cut off the utility lines, 14 developed severe ischemic heart disease (UA and MI), and one developed non-severe heart disease. Eighty-five participants did not receive any threat from the authority to cut off utility lines. Among them, 35 developed severe ischemic heart disease, and 50

developed non-severe ischemic heart disease. The severity of ischemic heart disease about the threat of authority to cut off utility lines is statistically significant ($P=.000$, $\chi^2=13.87$).

Twenty-four participants had received threats from anyone. Among them, 19 developed severe, and 05 developed non-severe ischemic heart disease. Seventy-six participants did not receive any threat from anyone; 30 developed severe, and 46

developed non-severe ischemic heart disease, which is statistically significant. ($P= .000$, $\chi^2=11.5$).

This difference is not statistically significant among the participants who have or do not have transportation problems. Other non-medical health-related social risk domains like physical hurt from anyone, cursing from anyone, and other household-related issues were not statistically significant.

Table 3: Frequency distribution of different non-medical health-related social risk domains about ASCVD risk score.

Variable		Number	Intermediate ASCVD risk scores	High ASCVD risk scores	χ^2 value	P value
Housing problems	Yes	92	56	36	.008	.927
	No	08	5	3		
Bug infestation	Yes	18	8	10	2.529	.111
	No	82	53	29		
Mold	Yes	13	8	5	.002	.966
	No	87	53	34		
Oven not working	Yes	26	16	10	.004	.947
	No	74	45	29		
Water leak	Yes	31	20	11	.233	.629
	No	69	41	28		
Worried about last 12 months food will be run out	True	24	14	10	.094	.758
	Not true	47	47	29		
Transportation problems in the last 12 months	Yes	48	31	17	.498	.480
	No	52	30	22		
In the last 12 months, the authority threatened to cut off the line	Yes	14	8	6	.102	.749
	No	86	53	33		
Physically hurt from anyone	Yes	24	14	10	.094	.758
	No	76	47	29		
I got insult from anyone	Yes	48	30	18	.087	.767
	No	52	31	21		
Threat from anyone	Yes	24	15	9	.030	.862
	No	76	46	30		
Curse from anyone	Yes	36	23	13	.197	.656
	No	64	38	26		

Table 3 shows the frequency distribution of non-medical health-related social risk domains and different ASCVD scores and χ^2 value and p values. The ASCVD risk scores about individual variables of non-medical health-related social risk domains were not statistically significant for any variable.

Discussion

Many previous surveys on Acute coronary syndrome all over the globe unveiled conventional ASCVD risk factors as the vital domains for both the principal foundation and prevention of cardiovascular diseases. In this research, non-medical health-related social risk domains were

investigated to find out potential risk areas that might have some effects on human well-being in general and coronary artery disease severity in specific. The AHC HRSN (The Accountable Health Communities Health-Related Social Needs)2 screening tools identified unmet social needs across five core domains: Housing instability, Food insecurity, Transportation problems, Utility help needs, and Interpersonal safety. The study revealed that 92 out of 100 (92% of the total) participants had housing problems. Among them, 45.65% (n=42) participants had severe ischemic heart disease (MI and UA), and 54.34% (n=50) participants developed no severe ischemic heart. Whereas 8 out of 100 had no problems with housing. Among them, 8 developed severe heart disease. (p=.023, $\chi^2=5.157$ and OR=1.167) that implied a statistically significant association between housing facilities and severe ischemic heart disease. This study supports the study conducted by Baggett TP, Hwang SW, O'Connell JJ, et al. "Mortality among homeless adults in Boston: shifts in causes of death over 15 years," where the cardiovascular cause of death was higher in homeless people than in non-homeless people. (RR=5.1 in up to 44 years of age, RR=3.5 in 45-64 years of age group.)⁵

The study revealed that 18 (18% of total) participants had bug infestations at home. Among them, 77.8% (n=14) participants had severe ischemic heart disease (MI and UA), and 22.2% (n=4) participants suffered from non-severe ischemic heart disease. Of the 82 participants without bug infestation, 35 and 47 developed severe and non-severe heart disease. (P=.007 $\chi^2=7.275$ and OR=4.700). Among the mold infestation group of 13 (13% of total), 10 (76.9% and 3 (23.1%) developed severe and non-severe ischemic heart disease respectively (P=.031 $\chi^2=4.66$ and OR=4.103). As per this study, Bug and Mold infestation of houses significantly affected the severity of ischemic heart disease. Similar type of study is not available. To fill up this knowledge gap more elaborate study is required.

Among the food insecurity group of 24 out of 100 (24% of total), 19 (79.2% and 5 (20.8%) developed severe and non-severe ischemic heart disease respectively. Whereas 76 out of 100 did not have food insecurity, among them, 30 developed severe, and 46 developed non-severe heart disease. (P=.000 $\chi^2=11.5$ and OR=4.103). As per this study, food insecurity had significant effects on severity of ischemic heart disease. This study is

partly consistent with the study conducted by Sara A. Quandt et al., "Food insecurity was significant because of the health, social and psychological impacts of food insecurity and hunger".⁶

This study found that 15 out of 100 participants had perceived threat of authority to cut off the utility line, and among them, 14 developed severe and 1 developed non-severe heart disease. Whereas 85 out of 100 participants had no such threat, among them, 35 and 50 developed severe and non-severe heart disease, respectively. (p=.000, $\chi^2=13.87$ and OR=1.400). Anyone had threatened 24 out of 100 participants, and among them, 89.2% (n=19) participants had severe ischemic heart disease (p=.000, $\chi^2=11.5$ and OR=5.827). A similar study done by O. Kristina, A. Anders, et al., "Impact of Psychological Stress on Ischemic Heart Disease when Controlling for Conventional Risk Indicators," revealed that the relative risk of ischemic heart disease was six times higher than the stress experienced group.⁷

On the other hand, the study highlighted that lead paint or pipes, oven/stove problems, inadequate heat, smoke detectors, water leaks, transportation problems, being physically hurt by anyone, being insulted by anyone, and being cursed by anyone was not significant enough statistically to infer the difference in the occurrence of severe and non-severe ischemic heart diseases (P> 0.05).

The study also revealed the occurrences of severe heart disease were higher in those who had high ASCVD scores than that in intermediate ASCVD scores. The difference in occurrence of non-severe heart disease (SA) and severe heart disease (UA&MI) about high and intermediate ASCVD score is statistically significant (p=.000, $\chi^2= 47.98$ OR=44.308)

Conclusion:

This research was intended to determine the differences between severe and non-severe ischemic heart disease occurrences in terms of ASCVD risk score and the non-health-related social risks domain. The study revealed that housing problems, food insecurities, interpersonal safety threats, bug and mold infestation were significantly related to the higher occurrences of severe ischemic heart disease. Generally, the occurrences of severe ischemic heart disease were higher among those having high ASCVD score.

Reference:

1. Raistan SH, Penman ID, Strachan MWJ, Hobson RP. Davidson's principles and Practices of Medicine. 23rd Edition. Elsevier. London 2018.
2. Medicaid Services. (2017, September 05). Accountable Health Communities Model. <https://innovation.cms.gov/initiatives/ahcm>.
3. American College of Cardiology, American Heart Association. ASCVD Risk Estimator. Available at: https://tools.acc.org/ldl/ascvd_risk_estimator/index.html/calculate/estimator. Accessed September 21, 2018.
4. Goff DC Jr, Lloyd-Jones DM, Bennett G, et al. 2013 ACC/AHA guideline on assessing cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014;63:2935–59.
5. Baggett TP, Hwang SW, O'Connell JJ, et al. Mortality among homeless adults in Boston: shifts in causes of death over 15 years. *JAMA Intern Med* 2013;173:189–95
6. Sara A, Quandt, Thomas A., et al. The household food insecurity and health outcomes of US–Mexico border migrant and seasonal farmworkers. *Public Health Reports*, Nov-2004, vol-119, 568–576.
7. Kristina O, Anders A et al. Impact of Psychological Stress on Ischemic Heart Disease when Controlling for Conventional Risk Indicators. *journal of human stress*; July 2010:Vol-6,issue-1, p.7-15.