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Healthcare service utilisation among adults with coronary artery disease in rural Aluva, South India: a community-based cross-sectional study

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ABSTRACT

Objectives To assess the pattern and determinants of healthcare service utilisation among adults with coronary artery disease (CAD) in a rural setting in Kerala, India.

Design A community-based cross-sectional analysis conducted within a study cohort.

Setting The study was conducted from January 2022 to March 2022 within the ENDIRA Cohort (Epidemiology of Non-communicable Diseases In Rural Areas) in the rural part of Aluva municipality of Ernakulam district, Kerala, India, which comprises five adjacent panchayats with a population of approximately 100,000 individuals.

Participants Patients with CAD aged 35–80 years from the ENDIRA cohort with a history of at least one event of myocardial infarction in the past decade.

Outcome measures The main outcome measured was the inadequacy of healthcare service utilisation among patients with CAD. The factors evaluated included age, gender, socioeconomic status, insurance, out of pocket expenses, choice of health care facility for follow up, distance from health centre as well as reported alcohol use, tobacco use and healthcare satisfaction

Results The study encompassed 623 participants with a mean age of 65.12 (±8.55) years, of whom 71% were males. The prevalence of inadequate utilisation of health services was 58.7%. The independent predictors of underutilisation included reported alcohol consumption (adjusted OR (AOR) 2.36; 95% CI 1.41 to 3.95), living more than 20 km from healthcare facilities (AOR 1.96; 95% CI 1.14 to 3.37) as well as the preferences for specific doctors and adequate services at healthcare facilities (AOR 3.43; 95% CI 1.46 to 8.04). The patients with monthly CAD medication expenses exceeding Rs4000 had 0.26 times lesser odds to underuse healthcare services (AOR 0.26; 95% CI 0.10 to 0.65).

Conclusion The study reveals a suboptimal pattern of healthcare service utilisation among patients with CAD. Ensuring community access to standardised, high-quality follow-up care is crucial for enhancing healthcare utilisation following CAD.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study focuses on the patterns of health service utilisation among patients with coronary artery disease who require lifelong follow-up and medications.
⇒ There was a response rate of more than 90%.
⇒ There is limited geographical and ethnic diversity among the study participants.
⇒ Being conducted within an established cohort facilitated patient access, although this cohort may not be reflective of the broader rural population's healthcare-seeking behaviour.
⇒ There is a potential risk of social desirability bias in responses.

INTRODUCTION

The dynamic landscape of global health has experienced a profound shift.[1] Once dominated by communicable diseases, the burden has now tipped towards chronic, non-communicable diseases (NCDs), which have become the leading factors in global morbidity and mortality.[1] This epidemiological transition underscores the need for a pivot towards continuous, person-centred and community-integrated care systems designed to meet the long-term management requirements of NCDs, a cornerstone of contemporary healthcare infrastructures.[2]

Recent insights from the WHO 2023 report reveal that NCDs account for 74% of all deaths, highlighting the urgency of addressing this healthcare crisis.[3] Within the NCD spectrum, cardiovascular diseases (CVDs) stand out as primary causes of global disability and death.[4] In 2021, the toll of CVD was profound, claiming approximately 20.5 million lives—a staggering 32% of all global mortalities.[4 5] This surge was largely attributable to coronary artery diseases (CADs),[6] particularly afflicting low-income countries,[7] where 75% of the 7.3 million CAD-related deaths were reported in 2001; a figure which escalated to 9.48 million by 2016.[8] Notably, CAD mortality rates are declining in higher-income countries, attributable to the

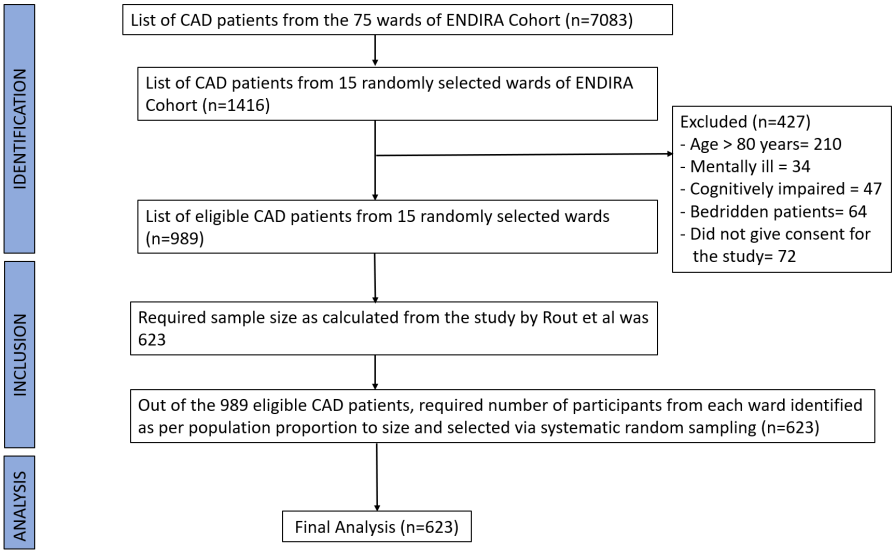

Figure 1 Study flow chart. CAD, coronary artery disease; ENDIRA, Epidemiology of Non-communicable Diseases In Rural Areas.

implementation of advanced management and primary and secondary preventative measures.[9]

The Global Burden of Diseases study (1990–2019) complements this narrative, depicting an upwards trajectory of cardiovascular health burdens in low-income and middle-income countries (LMICs) amid climbing diabetes rates and body mass index figures.[10 11] LMICs, including India, face elevated CAD mortality rates due to the absence of effective primary and secondary preventive strategies, insufficient intervention techniques and underutilisation of existing health facilities.[9] The 5-year rate of recurrent myocardial infarction, stroke, heart failure and cardiovascular death among patients with known CVD is between 20% and 30% which has been estimated to be 4–5 times greater than the rate among moderate-risk and high-risk individuals without known CVD.[12]

In this vein, Kerala—a state in southern India renowned for its health outcomes sits at the pinnacle of epidemiological evolution, grappling with a dramatic increase in NCD prevalence and associated premature mortality.[13 14] To mitigate this alarming trend, amplifying healthcare service utilisation for timely disease screening, diagnosis and consistent patient follow-up is crucial.[15] The public's engagement with these services underpins the overall health and well-being of the community.[16] However, as per the latest National Sample Survey report, in rural areas of India, the overall utilisation of public healthcare facilities was only 46%.[17] Greater reliance on private healthcare facilities will further increase the out-of-pocket expenses (OOPE) in India which is among the highest in the world.[18] This continues to presage a severe public health challenge, inhibiting the efficacy of healthcare delivery.[19 20]

Underutilisation denotes the failure to access beneficial, affordable healthcare services with the potential to significantly improve life quality and longevity.[21] This phenomenon is multifaceted, steered by an amalgam of personal and societal variables.[22] These encompass individual awareness of care need, accessibility to care, the

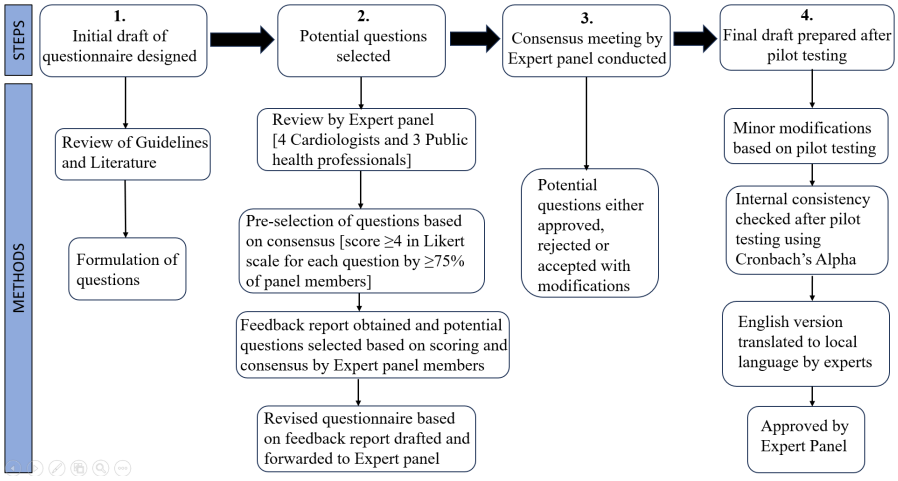

Figure 2 Development of the assessment tool.

Table 1 Sociodemographic characteristics and habits

Sl no.	Basic characteristics	Frequency (n)	%
1.	Local self-government area (panchayat)		
	Kalady	105	16.9
	Karukutty	160	25.7
	Manjapra	69	11
	Mukkanoor	127	20.4
	Thuravoor	162	26
2.	Age (in years)		
	35–45	12	1.9
	46–55	77	12.4
	56–65	205	32.9
	>65	329	52.8
3.	Gender		
	Male	442	70.9
	Female	181	29.1
4.	Religion		
	Hindu	229	36.8
	Christian	379	60.8
	Muslim	15	2.4
5.	Marital status		
	Married	554	88.9
	Unmarried	29	4.7
	Widow or divorced	40	6.4
6.	Education		
	No formal education	38	6.1
	Primary (1–4 standards)	142	22.8
	Middle (5–7 standards)	147	23.6
	High school (8–10 standards)	210	33.7
	Higher secondary (11–12 standards)	45	7.2
	Graduation	34	5.5
	Post graduation	7	1.1
7.	Occupation		
	Professional	17	2.7
	Skilled	100	16
	Unskilled	117	18.8
	Homemaker	185	29.7
	Unemployed	117	18.8
	Retired	87	14
8.	Socioeconomic status		
	APL*	427	68.5
	BPL†	196	31.5
7.	Type of family		
	Nuclear family	435	69.8
	Joint family	61	9.8
	Three generation family	127	20.4
8.	Number of family members		
	≤4	402	64.5
	>4	221	35.5
9.	Reported tobacco use (in any form) at present		
	Yes	58	9.3
	No	565	90.7
10.	Reported alcohol use at present		
	Yes	111	17.8
	No	512	82.2

*APL (based on the colour of ration card).
†BPL (based on the colour of ration card).
APL, above poverty line; BPL, below poverty line.

volition to seek care, the sustained quality of healthcare services, patient contentment and the fiscal resources allocated to healthcare resilience by the state government.[22] These elements influence the patients' choice in using the healthcare facilities (public or private). Given the chronic nature of NCDs, a sustained patient–health system interaction is imperative to prevent their progression to life-threatening conditions.[2] The consequences are severe—increased morbidity and mortality among patients with NCD and escalating OOPE, which ultimately lead to considerable socioeconomic burdens.[22 23]

Thus, understanding patients' preferences in healthcare facility utilisation is crucial in providing insights that can inform tailored community interventions. Data on healthcare service utilisation, particularly among CAD patients in Kerala, are scant. This community-based study was conducted in the rural area of Aluva municipality in Ernakulam district, Kerala, with the objective to assess the pattern and determinants of healthcare service utilisation among adult patients with CAD.

METHODS

Study design, setting and population

A community-based cross-sectional study was conducted in the rural part of Aluva municipality[24] of Ernakulam district in the state of Kerala, South India during January 2022 to March 2022 from the ENDIRA cohort[25] (Epidemiology of Non-communicable Diseases In Rural Areas) which is being followed up since 2010. This cohort covers 5 panchayats (consisting of 75 wards[24]) namely Kalady, Karukutty, Manjapra, Mukkanoor and Thuravoor. As per the constitution of India, a 'panchayat' is a local self-government institution for the rural areas and a 'ward' is a territorial region within each local self-government institution.[24 26] CAD was defined as per Sheridan and Crossman review.[27] The Strengthening the Reporting of

Table 2 Pattern of healthcare service utilisation

Sl. no.	Basic characteristics	Frequency (n)	%
1.	Doctor visited for CAD follow-up		
	General physician	167	26.8
	Consultant	395	63.4
	Others*	61	9.8
2.	Choice of healthcare facility for follow-up		
	Only public facilities	110	17.7
	Only private facilities	332	53.3
	Both public and private facilities	168	27
	Self-medication	13	2
3.	Follow-up visits in the last 1 year		
	<3	336	53.9
	≥3	287	46.1
4.	System of medicine preferred for CAD follow-up		
	Modern medicine	577	92.6
	Ayurveda	26	4.2
	Homeopathy	13	2.1
	Others†	7	1.1
5.	Out-of-pocket expenses for CAD medication (in Rs)		
	Nil	44	7.2
	1–4000	520	83.4
	>4000	59	9.4
6.	Distance between home and healthcare centre (in km)		
	1–10	401	64.4
	11–20	136	21.8
	>20	86	13.8
7.	Follow-up in the same healthcare facility where primary treatment was received		
	Yes	452	72.6
	No	171	27.4
8.	Reasons for choosing healthcare facility for follow-up		
	Primary treatment taken from there	267	42.9
	Nearby home	317	50.9
	Others‡	39	6.2
9.	Health insurance		
	Yes	245	39.3
	No	378	60.7
10.	Reported healthcare satisfaction		
	Yes	596	95.7
	No	27	4.3

*Others—family doctor, Ayurveda, Yoga and Naturopathy, Unani, Siddha, Homeopathy.
†Others—Siddha, Unani, Yoga and Naturopathy.
‡Others—doctor specific, waiting time specific, availability of required service, insurance specific.
CAD, coronary artery disease.

Observational Studies in Epidemiology cross-sectional study checklist was used to guide the reporting.

Individuals from the ENDIRA Cohort aged 35–80 years who had been diagnosed with at least one event of myocardial infarction over the previous 10 years (as per the discharge summary from the hospital) were eligible to participate in the study. The exclusion criteria included (1) stroke patients or patients in coma who are cognitively impaired and are unable to answer the questions of the interview; (2) mentally ill patients and (3) bedridden patients.

Sampling method

The complete list of patients with CAD from all the 75 wards in the ENDIRA cohort was available. However, due to practical difficulties in reaching out to all the wards (lack of resources, finance, man power as well as time constraints), 15 out of the 75 wards were selected by simple random sampling and the required number of participants from each ward were identified according to population proportion to size. The participants within each ward were selected via systematic random sampling using a sampling interval of three. Every third person from the list of patients with CAD from the selected wards was recruited into the study as per the inclusion criteria till the desired sample size was achieved. The study flow chart is shown in figure 1.

Sample size

The sample size was calculated from the proportion of public health facilities' outpatient services used in India (25.1%) from the study by Rout *et al*.[28] The formula used was $n=Z^2_{1-\alpha/2}PQ/d^2$ [$Z_{1-\alpha/2}$=1.96, P=25.1, Q=74.9, d (absolute precision)=3.5%] and the final sample size came up to 623 with a 95% response rate.

Study procedure and study tool

Prior informed consent was taken and each participant was personally interviewed via house visits by the study personnel along with the ASHA (Accredited Social Health Activist)[29] of that particular ward who were trained by the principal investigator before the start of the data collection process.

A validated assessment tool applicable for measuring the utilisation of healthcare services was not available. Hence, a tool was developed using a four-step mini modified Delphi consensus method (figure 2).[30 31] The first version was prepared in English from established guidelines and published literature.[28 32–36] An expert panel including four cardiologists and three public health professionals rated the questions on a Likert scale from 1 (highly inapplicable) to 5 (highly applicable). The questions were evaluated based on two stages: preselection of questions using a median score ≥4 followed by the degree of consensus among expert panel members. Consensus was reached if ≥75% of members scored ≥4 for a particular question. Additionally, written feedback was also obtained. Based on the feedback of the panel,

Table 3 Independent predictors of inadequate utilisation of healthcare services

Sl. no.	Variables	Utilisation of healthcare services		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
		Adequate n (%)	Inadequate n (%)		
1.	Local self-government area (Panchayat)				
	Centrally located	94 (58)	68 (42)	0.792 (1.57 to 1.09)	–
	Peripherally located	163 (35.4)	298 (64.6)	1	
2.	Age (in years)				
	≤60	68 (40.2)	101 (59.8)	1	–
	>60	189 (41.6)	265 (58.4)	0.944 (0.65 to 1.35)	
3.	Gender				
	Male	168 (38)	274 (62)	**1.578 (1.11 to 2.23)***	1.28 (0.88 to 1.87)
	Female	89 (49.2)	92 (50.8)	1	1
4.	Marital status				
	Married	223 (40.3)	331 (59.7)	1	–
	Unmarried	12 (41.4)	17 (58.6)	0.95 (0.44 to 2.03)	
	Widow or divorced	22 (55)	18 (58.5)	0.55 (0.28 to 1.05)	
5.	Educational qualification				
	No formal education	23 (60.5)	15 (39.5)	0.46 (0.18 to 1.13)	–
	Primary to higher secondary	217 (39.9)	327 (60.1)	1.06 (0.56 to 2.03)	
	Graduation and postgraduation	17 (41.5)	24 (58.5)	1	
6.	Reported tobacco use (in any form) at present				
	Yes	13 (22.4)	45 (77.6)	**2.63 (1.38 to 4.98)***	1.56 (0.76 to 3.19)
	No	244 (43.2)	321 (56.8)	1	1
7.	Reported alcohol use at present				
	Yes	25 (22.5)	86 (77.5)	**2.85 (1.76 to 4.59)***	**2.36 (1.41 to 3.95)***
	No	232 (45.3)	280 (54.7)	1	1
8.	Number of family members				
	≤4	163 (40.5)	239 (59.5)	1	–
	>4	94 (42.5)	127 (57.5)	0.92 (0.66 to 1.28)	
9.	Socioeconomic status				
	APL†	171 (40)	256 (60)	1	–
	BPL‡	86 (43.9)	110 (56.1)	0.85 (0.60 to 1.21)	
10.	Out-of-pocket expenses for CAD medication (in Rs)				
	Nil	11 (25)	33 (75)	1	1
	1–4000	211 (40.6)	309 (59.4)	**0.48 (0.24 to 0.98)***	0.63 (0.30 to 1.34)
	>4000	35 (59.3)	24 (40.7)	**0.22 (0.09 to 0.53)***	**0.26 (0.10 to 0.65)***
11.	Distance between home and healthcare centre (in km)				
	1–10	161 (40.1)	240 (59.9)	1	1
	11–20	72 (52.9)	64 (47.2)	**0.59 (0.40 to 0.88)***	**0.65 (0.43 to 0.99)***
	>20	24 (27.9)	62 (72.1)	**1.73 (1.03 to 2.89)***	**1.96 (1.14 to 3.37)***
12.	Reasons for choosing healthcare facility for follow-up				
	Nearby home	112 (41.9)	155 (58.1)	1	1
	Primary treatment was taken from there	137 (43.2)	180 (56.8)	0.94 (0.68 to 1.32)	1.04 (0.73 to 1.48)
	Others§	8 (20.5)	31 (79.5)	**2.8 (1.24 to 6.32)***	**3.43 (1.46 to 8.04)***
13.	Health insurance				

Continued

Table 3 Continued

Sl. no.	Variables	Utilisation of healthcare services		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
		Adequate n (%)	Inadequate n (%)		
	Yes	103 (42)	142 (58)	1	–
	No	154 (40.7)	224 (59.3)	1.05 (0.76 to 1.46)	
14.	Doctor visited for CAD follow-up				
	General physician	64 (38.3)	103 (61.7)	1	–
	Consultant	172 (43.5)	223 (56.5)	0.80 (0.55 to 1.16)	
	Others¶	21 (34.4)	40 (65.6)	1.18 (0.64 to 2.18)	
15.	Choice of healthcare facility for follow-up				
	Only public facilities	45 (40.9)	65 (59.1)	1	–
	Only private facilities	140 (42.2)	192 (57.8)	0.94 (0.61 to 1.47)	
	Both public and private facilities	70 (41.7)	98 (58.3)	0.96 (0.59 to 1.58)	
	Self-medication	2 (15.4)	11 (84.6)	3.80 (0.80 to 1.80)	
16.	Reported healthcare satisfaction				
	Yes	252 (42.3)	344 (57.7)	1	1
	No	5 (18.5)	22 (81.5)	**3.22 (1.20 to 8.62)***	2.80 (0.97 to 8.10)

Adequate utilisation of health services was taken as the reference category.
OR adjusted for gender, reported tobacco use at present, reported alcohol use at present, out-of-pocket expenses for CAD medication, distance between home and healthcare centre, reasons for choosing healthcare facility for follow up and reported healthcare satisfaction.
**p<0.05 is statistically significant.
†APL (based on the colour of ration card).
‡BPL (based on the colour of ration card).
§Others—doctor specific, waiting time specific, availability of required service, insurance specific.
¶Others—family doctor, Ayurveda, Yoga and Naturopathy, Unani, Siddha, Homeopathy.
APL, above poverty line; BPL, below poverty line; CAD, coronary artery disease.

the questions were revised to cover all requisite domains pertinent to the study objectives. A report containing the updated questions and rating results was sent to the expert panel again which was discussed in a consensus meeting where the questions were either approved, rejected or accepted with modifications.

This updated version of the questionnaire was pilot tested in a sample of 30 patients from the same study setting to test its feasibility, usability and acceptability. After the pilot study, minor modifications were made and the final draft was then submitted for approval to the expert panel. The final draft contained 44 questions (given in online supplemental material). The English version was then translated to the local language (Malayalam) by two different language experts. The original English version and the translated version were compared for concurrence and the required modifications were done as suggested by all the expert panel members. The internal consistency of the questionnaire was checked using Cronbach's alpha. Although the score of 0.67 was slightly below the acceptable threshold, the items given under the section 'Advise given by Doctor post index MI' section of the questionnaire (online supplemental material) appear to have a negative impact on the internal consistency.

The pre-tested, semistructured questionnaire consisted of seven domains: (1) basic information and sociodemographic details, (2) medical history and comorbidities, (3) habits including tobacco and alcohol usage, type as well as frequency, (4) details of follow-up visits for CAD specifically including number of follow-up visits in the last 1 year, system of medicine preferred for follow-up, type of health facility preferred for follow-up, reason for choice of health facility and reported healthcare satisfaction, (5) monthly expenditure for CAD medications, (6) health insurance and social security and (7) distance from the healthcare facility for follow-up. The socioeconomic status was classified into above poverty line and below poverty line based on the colour-coded ration cards issued by the Government of Kerala.[37]

Criteria for optimum utilisation of healthcare services

Healthcare service utilisation is defined as the number of outpatient department visits (either at public or private healthcare facilities) per person per year according to the Global Reference List of 100 Core Health Indicators published in 2018 by WHO.[33] Previous studies have shown that the average number of long-term follow-up visits per year for adequate adherence is three.[34–36] Hence, for this study, a minimum of three follow-up visits per year

and consumption of CAD medications prescribed by the doctor as per the universally accepted 2011 guidelines of the American Heart Association and American College of Cardiology Foundation[38] were considered as the criteria for optimum utilisation of healthcare services.

Statistical analysis

The data collected were then entered in Microsoft Excel (Microsoft, Washington, USA), numerically coded and analysed using IBM SPSS Statistics V.26 (IBM, Released 2019. IBM SPSS Statistics for Windows, V.26.0., IBM). Descriptive analysis for continuous variables was conducted to characterise the study population and was expressed in frequencies, percentages, mean (±SD) and median (IQR). A regression adjustment was used to find the independent predictors and to identify the potential confounders of inadequate utilisation of healthcare services. Simple logistic regression method was used for all the variables to compute the unadjusted OR. The variables with a p<0.05 were taken for multivariable logistic regression analysis and the independent predictors were expressed using adjusted ORs (AORs) along with 95% CIs. The regression coefficients were tested using the Wald statistic.

Patient and public involvement

Patients and the public were not specifically involved in the overall planning and design of the study. However, ASHA[29] workers (who are trained female community health activists) of the respective wards supported the principal investigator in data collection for this study and patient feedback was used to improve the questionnaire as part of the pilot study conducted in the beginning. The authors intend to disseminate the results of this study via the respective ASHA workers and patient support groups in order to improve the overall healthcare utilisation of CAD patients in the region.

RESULTS

Out of the total 989 eligible patients with CAD who gave consent for the study, 623 study participants were included as per the calculated sample size. A total of 72 patients did not give consent for the study and there was a response rate of 95% (figure 1).

The majority of the participants (26%) were from Thuravoor panchayat and most of them were males (70.9%). The mean (±SD) age of the study participants was 65.12 (± 8.55) years. The median (IQR) monthly expenditure for CAD medication was Rs2000 (1500, 3000) which was 11.16% of the average monthly income in the rural areas of Kerala as per the Ministry of Agriculture and Farmers Welfare 2022 report.[39] The details of the study participants are given in table 1.

Most of the participants (63.4%) preferred the follow-up to be done by the consultant and chose private healthcare services over public healthcare services. The remaining details are given in table 2.

A minimum of three follow-up visits and consumption of CAD medications as prescribed were taken as criteria to state the adequacy of utilisation of health services (stated in the 'Methods' section). Out of the 623 patients with CAD surveyed, 366 (58.7%) exhibited suboptimal utilisation of healthcare services.

The sociodemographic details along with other independent variables were compared with the utilisation of healthcare services. The five different panchayats were categorised based on the location for statistical analysis. Thuravoor and Mukkanoor panchayats are centrally located while Kalady, Karukutty and Manjapra panchayats are peripherally located. However, the utilisation of healthcare services with respect to the location was not found to be statistically significant (table 3).

The OR was adjusted for gender, reported tobacco use at present, reported alcohol use at present, OOPE for CAD medication, distance between home and healthcare centre, reasons for choosing healthcare facility for follow-up and reported healthcare satisfaction. Patients with self-reported alcohol use had 2.36 times the odds of inadequate utilisation of the healthcare services compared with those who did not use alcohol. The patients who spent more than Rs4000 per month on CAD medications had only 0.26 times the odds of underusing the health services compared with those who did not have any OOPE for CAD medications. Patients residing more than 20 km from the follow-up healthcare centre had 1.96 times the odds of underusing the services compared with those residing within 10 km. Patients who chose the healthcare centre for follow-up due to doctor-specific or other service-specific reasons had 3.43 times the odds of underusing services compared with those who chose it because of distance. The regression model was deemed fit using Hosmer and Lemeshow test (χ^2=9.55, p=0.29). The logistic regression model was statistically significant (χ^2=64.18, p<0.001). It explained 13.2% (Nagelkerke R^2) of the variance in the utilisation of healthcare services and correctly classified 58.7% of the cases. The independent predictors of inadequate utilisation of healthcare services are mentioned in table 3.

DISCUSSION

This study's exposition of healthcare service utilisation patterns among patients with CAD elucidates a complex interaction of personal behaviours, system accessibility and economic factors that significantly influence health-seeking actions. The revelation that more than half of the participants inadequately use healthcare facilities raises pivotal questions about the systemic barriers and personal decisions at play.

Recent studies have concluded that 25.1% of outpatients and 38.4% of inpatients in India use public healthcare services and despite the increasing OOPE, both outpatients and inpatients prefer the private health

sector (74.9% and 61.6%, respectively).[28] In this study, the majority (53.3%) of the patients preferred private hospitals as compared with public health facilities. A study done in Rajasthan by Srivastava *et al* concludes that only 35% of the population preferred using the public healthcare for catering to their health needs.[19] As per the survey done by Nair *et al* in 2019, 55.5% of the hospitalisations in Kerala were in the private sector which is consistent with the findings of this study.[40]

Half of the patients chose their preferred healthcare facility for follow-up based on whether the primary treatment for the CAD was taken from there or not. This inclination may be rooted in the established trust and perceived competency of the healthcare personnel in that institution who initially diagnosed the condition. Notably, patients citing doctor-specific as well as other service-specific reasons to choose the healthcare facility for follow-up had higher odds to underuse healthcare services as per this study suggesting that personalised care and efficiency may be critical factors in health facility selection. The study conducted by Sivanandan *et al* in 2020 concluded that 24.6% of the respondents did not opt for the government primary healthcare centres for follow-up as they felt there is a lack of appropriate health facilities.[41]

The patients who lived at a distance more than 20 km from the nearest healthcare facility had higher odds of underusing the health services and this was found to be statistically significant in this study. Prakash *et al* in 2020 concluded that 13.1% of the respondents did not utilise primary healthcare services due to the distance factor.[41]

In this study, the patients incurring a monthly expenditure exceeding Rs4000 on CAD medications demonstrated lower odds of underusing health services. This may be because of the financial mindset and the literacy level of the people of Kerala. This can also be due to the health literacy and the socioeconomic status of the people along with the fact that such patients might have been diagnosed only recently. Yip and Mahal concluded that escalating OOPE may preclude low-income households from accessing medical care as needed.[42] A study which compared 11 Asian countries found that India has one of the highest shares of out-of-pocket expenditure to total health expenditure.[43] Balarajan *et al* conclude that high out-of-pocket expenditures, insufficient public financing and lack of comprehensive methods of risk pooling are the main reasons affecting the equity in health financing.[44]

The study by Pati *et al* concludes that the self-reported health seeking behaviour was significantly worse in hazardous drinkers.[45] In this study, the patients with reported alcohol use had higher odds of inadequate healthcare utilisation which is consistent with the findings from the above-mentioned study. Although the association between self-reported tobacco use and utilisation of health services was statistically not significant in this study, the study by Mohan *et al* mentions that the tobacco users are more likely to start alcohol consumption in a follow-up period of 1 year as compared with non-tobacco users.[46]

The insurance coverage for patients with CAD in this study (39.3%) is higher than that reported by the study conducted by Daivadanam *et al*[47] which was 29% which shows that there is an improvement in the insurance coverage with time. The study by Ghia and Rambhad[48] states that only 37.2% of the total population in India is covered by some form of health insurance which is consistent with the findings of this study as well. This study did not find any statistically significant association between reported healthcare satisfaction and underutilisation of health services, however, the review by Lahariya concluded that the patients who experienced personalised and prolonged doctor–patient interaction time were more likely to return for additional healthcare needs highlighting the positive correlation between healthcare satisfaction and utilisation of health services.[49]

This community-based study has attempted to shed light on how patients with CAD use healthcare services, particularly since they require lifelong treatment and monitoring. The collaboration with local ASHA workers of the wards facilitated a response rate exceeding 90%. The study population demonstrates minimal diversity with respect to location and ethnicity.

Limitations of this study include a potential positive bias due to health education initiatives and surveys conducted within the study cohort over the past decade, which may not reflect the broader rural populations in India. The disruption of routine healthcare services during the COVID-19 pandemic, the omission of travel time and mode to healthcare centres and a subjective assessment of healthcare satisfaction may also influence the findings. The possibility of a social desirability bias and the inability to establish causality due to the cross-sectional nature of the study are additional considerations.

Way forward

The findings underscore the need for multifaceted interventions targeting both individual behaviours and healthcare system inefficiencies. Strategic and evidence-based policies that streamline healthcare delivery, augment rural healthcare infrastructure and implement health education that empowers individuals optimal healthcare service utilisation should be advocated.[50] Policies prioritising the upgrade of rural healthcare infrastructure, coupled with health education initiatives, are essential for improving healthcare utilisation.

CONCLUSION

This study reveals a notable underutilisation of healthcare services among patients with CAD, a pattern shaped by a complex interplay of personal and community-level factors. These include alcohol use, distance from healthcare centres, monthly medical expenses and individual preferences related to healthcare experiences. This research contributes to the broader initiative of shifting

the healthcare paradigm towards greater efficiency, accessibility and effectiveness, ultimately aiming to raise public health standards amid the ongoing challenge of NCDs.

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