

Awareness of Cardiovascular Disease as the Primary Cause of Mortality in Women: Insights from a Survey of 7,920 Individuals

Kadınlarda Kardiyovasküler Hastalıkların Birincil Ölüm Nedeni Olduğuna Dair Farkındalık: 7920 Kişilik Anket Çalışmasından Elde Edilen Bulgular

ABSTRACT

Objective: Cardiovascular disease (CVD) remains the main cause of mortality worldwide for both women and men. However, women are often overlooked as victims of CVD, leading to underdiagnosis and undertreatment. We aimed to assess public awareness of CVD as the leading cause of death in women.

Method: This nationwide survey was conducted to evaluate awareness of CVD as the primary cause of female mortality. Individuals aged 18 to 80 years from across Türkiye were invited to complete a brief, structured questionnaire.

Results: A total of 7,920 individuals were surveyed, of whom 59% were female. Only 34% of women and 38% of men correctly identified CVD as the leading cause of death in women ($P = 0.0001$). In contrast, malignant diseases—particularly breast cancer—were cited as the leading cause by 46% of women and 42% of men. Educational attainment was not associated with greater awareness. Among women, age was the only factor independently correlated with awareness, while in men both age and a history of coronary artery disease (CAD) were significantly associated with awareness.

Conclusion: Public awareness of CVD as the leading cause of death in women remains alarmingly low in Türkiye. Neither higher education nor the presence of cardiovascular risk factors was associated with increased awareness. Age emerged as the primary correlate in women, and both age and CAD history in men. These findings suggest that awareness of female CVD mortality may be shaped more by personal experience than by formal education, highlighting a critical gap in national health literacy.

Keywords: Awareness, cardiovascular disease, female heart, mortality

ÖZET

Amaç: Kardiyovasküler hastalıklar (KVH), halen dünya genelinde hem kadınlar hem de erkekler için en önemli ölüm nedenidir. Ancak kadınlar KVH'nin mağduru olarak yeterince dikkate alınmamakta, bu da yetersiz tanı ve tedaviye yol açmaktadır. Bu çalışmada, kadınlarda KVH'nin başlıca ölüm nedeni olduğuna yönelik toplumsal farkındalık düzeyini değerlendirmeyi amaçladık.

Yöntem: Bu ulusal çaplı anket çalışması, kadınlarda KVH'nin en yaygın ölüm nedeni olduğuna dair farkındalığı değerlendirmek amacıyla tasarlandı. Ülke genelinde 18 ila 80 yaşları arasındaki bireylerin, kısa ve yapılandırılmış bir anketi yanıtlamaları istenildi.

Bulgular: Toplam 7920 birey çalışmaya katıldı; bunların %59'u kadındı. Kadınların sadece %34'ü ve erkeklerin %38'i KVH'nin kadınlardaki başlıca ölüm nedeni olduğunu doğru şekilde bildirdi ($P = 0.0001$). Buna karşın, özellikle meme kanseri olmak üzere malign hastalıklar, kadınların %46'sı ve erkeklerin %42'si tarafından ilk sıradaki ölüm nedeni olarak belirtildi. Eğitim düzeyi, farkındalıkla ilişkili bulunmadı. Kadınlarda yaş, farkındalıkla bağımsız olarak ilişkili tek faktörken; erkeklerde hem yaş hem de koroner arter hastalığı (KAH) öyküsü farkındalıkla anlamlı düzeyde ilişkiydi.

Sonuç: Türkiye'de KVH'nin kadınlardaki en yaygın ölüm nedeni olduğuna dair farkındalık alarm verici düzeyde düşüktür. Daha yüksek eğitim düzeyi ya da kardiyovasküler risk faktörlerinin varlığı artmış farkındalıkla ilişkili bulunmamıştır. Kadınlarda farkındalıkla en çok ilişkili faktör yaşken, erkeklerde yaş ve KAH öyküsü öne çıkmıştır. Bu bulgular, kadınlardaki KVH'ye bağlı ölümlere dair farkındalığın daha çok kişisel deneyimlerle şekillendiğini, eğitimle yeterince desteklenmediğini ve bu alanda ciddi bir sağlık okuryazarlığı eksikliğini ortaya koymaktadır.

Anahtar Kelimeler: Farkındalık, kardiyovasküler hastalıklar, kadın kalbi, mortalite

ORIGINAL ARTICLE KLİNİK ÇALIŞMA

Müge Ildızlı Demirbaş¹

Meral Kayıkçıoğlu²

¹Department of Cardiology, Koşuyolu High Specialty Research and Training Hospital, Istanbul, Türkiye

²Department of Cardiology, Ege University Faculty of Medicine, Izmir, Türkiye

Corresponding author:

Müge Ildızlı Demirbaş
✉ mildizli@yahoo.com

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Cardiovascular disease (CVD) remains the major cause of mortality worldwide for both men and women.¹ However, CVD in women continues to be under-recognized and undertreated.^{2,3} Historically, women have been underrepresented in biological research and clinical trials, partly due to the exclusion of women of childbearing potential and older women with comorbidities.² This exclusion has limited our understanding of sex-specific differences in the pathophysiology, clinical presentation, and management of CVD.

While traditional CVD risk factors become more prominent with advancing age, women face additional sex-specific and inflammatory risk factors that contribute to their cardiovascular risk earlier in life. These include early menarche, premature menopause, gestational hypertension and diabetes, preterm delivery, use of oral contraceptives, and hormone replacement therapy.⁴⁻⁶ Furthermore, autoimmune and inflammatory conditions—such as systemic lupus erythematosus, rheumatoid arthritis, and scleroderma—occur more frequently in women and substantially increase their risk of cardiovascular events.⁷ In many of these contexts, women may not meet conventional criteria for cardiovascular risk, resulting in delayed recognition and treatment.

There is a paucity of data on many aspects of CVD in women, which may contribute to poor awareness of CVD as a leading cause of female mortality. Low awareness results in inadequate modification of risk factors and delayed diagnosis and treatment of CVD, thereby exposing women to greater cardiovascular risk.^{8,9} In a 2019 American Heart Association (AHA) survey, only 44% of female respondents were aware that CVD is the main cause of mortality in women.⁹ A recent review analyzed 36 studies from countries including the United States, Italy, Malaysia, South Korea, the United Arab Emirates, France, Jordan, Argentina, Canada, South Africa, and Chile, and revealed consistently low awareness of CVD in women across diverse populations, with particularly lower awareness in developing countries.⁸ As such data are lacking in Türkiye, we aimed to investigate awareness of CVD as the leading cause of female mortality.

Materials and Methods

This nationwide, cross-sectional survey enrolled individuals (men and women) aged 18–80 years through random sampling across all cities of Türkiye. Subjects with overt mental disability hindering participation or the ability to provide informed consent were excluded. The study was conducted in accordance with the principles of the Declaration of Helsinki (1975), as revised in 2008. Koşuyolu High Specialty Research and Training Hospital Clinical Trials Ethics Committee approved the study (Approval Number: 2023/18/747, Date: 21.11.2023), and informed consent was obtained from all participants.

Participants completed a structured 12-item questionnaire developed specifically for this study by a cardiologist (MK) experienced in survey design, preventive cardiology, and epidemiology. Data were collected through face-to-face interviews conducted by trained volunteers. The instrument collected information on demographics (age, sex, height, weight, educational attainment, and profession), cardiovascular risk factors (hypertension, diabetes mellitus, hypercholesterolemia), and lifestyle behaviors (smoking status, exercise habits). The core question assessing awareness was:

ABBREVIATIONS

AHA	American Heart Association
ANOVA	Analysis of variance
APC	Annual percentage change
BMI	Body mass index
CAD	Coronary artery disease
CVD	Cardiovascular disease
IQR	Interquartile range
MI	Myocardial infarction
TURKMI	Turkish Myocardial Infarction
VIRGO study	The Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients

"In your opinion, what is the primary cause of mortality in women?" Response options included: heart attack/heart vessel disease, various cancers (breast, lung, genital), cerebral bleeding, and an open-ended option for other causes. While the questionnaire was reviewed for face validity by experts and pilot-tested on a small group representative of the study population to assess clarity, feasibility, and relevance, definitions of comorbidities were based on participant self-report. Obesity was defined as a body mass index (BMI) greater than 30 kg/m².

Statistical analyses were performed using SPSS software (IBM Corp., SPSS Statistics for Windows, Version 25.0, Armonk, NY, USA). Continuous variables were presented as mean $\pm$ standard deviation or median with interquartile range (IQR), depending on distributional characteristics. Categorical variables were expressed as numbers of subjects and percentages. Given the large sample size ($n > 2,000$), assessment of variable distribution was conducted primarily using histograms, along with evaluations of skewness and kurtosis. Variables with non-normal distributions were reported as medians with IQRs.

The chi-square test was used to compare categorical variables. Differences between the sexes for continuous variables were assessed using the independent-samples t-test or the Mann-Whitney U test, as appropriate. Mean values were compared using the independent-samples t-test or one-way analysis of variance (ANOVA). Logistic regression analysis was performed to model relationships between dependent and independent variables. A *p* value less than 0.05 was considered statistically significant.

Results

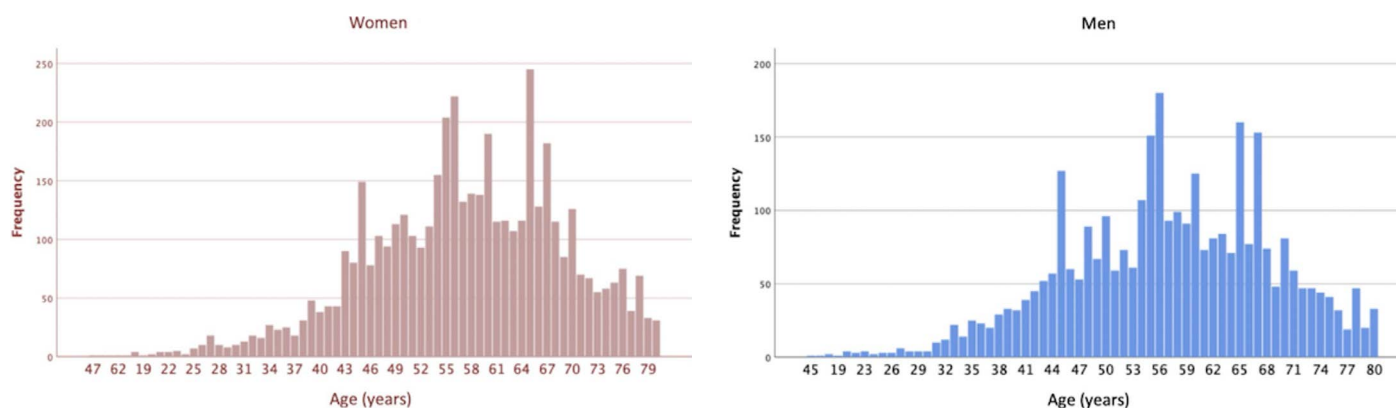
A total of 7,920 respondents were included in the analysis. Females constituted 59% ($n = 4,643$) of the study population. Table 1 presents the demographic and clinical characteristics of the participants. The mean age was 57.27 ± 11.47 years, with no significant difference between women and men (Figure 1).

Educational background varied widely: 13% of participants were university graduates, while another 13% reported no formal education. Notably, 20% of women and 3.8% of men were illiterate—rates considerably higher than official figures from the Turkish Statistical Institute. Moreover, 85% of participants were primary school graduates or above—a proportion far lower than that of the general population.¹⁰ Employment status also revealed a marked gender gap, with substantially fewer women in the workforce.

Table 1. Baseline characteristics of the population and comparison of awareness of CVD as the primary cause of death in women according to sex

	All (n = 7,920)	Female (n = 4,643)	Male (n = 3,277)	P
Age (years) (mean ± SD) (min-max)	57.27 ± 11.47 (18-80)	57.42 ± 11.48 (18-80)	57.05 ± 11.45 (18-80)	0.168
BMI (kg/m ²), (mean ± SD)	27.89 ± 4.25	28.25 ± 4.72	27.39 ± 3.42	< 0.001
Educational status, n (%)				< 0.001
Illiterate	1059 (13.4)	935 (20.1)	124 (3.8)	
Primary school graduate	3063 (38.7)	2016 (43.4)	1047 (31.9)	
Secondary/high school graduate	2739 (34.6)	1283 (27.6)	1456 (44.4)	
Bachelor's degree or higher	1059 (13.4)	409 (8.8)	650 (19.8)	
In employment, n (%)	2549 (32.1)	794 (17.1)	1755 (53.6)	< 0.001
Cardiovascular risk factors, n (%)				
Hypertension, n (%)	2557 (32.28)	1575 (33.92)	982 (29.96)	< 0.001
Diabetes mellitus, n (%)	715 (9.02)	422 (9.1)	293 (8.9)	0.427
Hyperlipidemia, n (%)	2871 (36.3)	1652 (35.6)	1219 (37)	0.073
Obesity, n (%)	2082 (26.3)	1432 (30.8)	650 (19.8)	< 0.001
Smoking, n (%)				< 0.001
Non-smoker	5194 (65.6)	3804 (81.9)	1390 (42.4)	
Ex-smoker	1015 (12.8)	297 (6.4)	718 (21.9)	
Current smoker	1711 (21.6)	542 (11.7)	1169 (35.7)	
Regular exercise habit, n (%)				
No-exercise	6820 (86.1)	4154 (89.5)	2666 (86.1)	< 0.001
≤ 3 hours/week	904 (11.4)	417 (8.9)	487 (14.9)	< 0.001
> 3 hours/week	196 (2.5)	72 (1.5)	124 (3.8)	< 0.001
Coronary artery disease, n (%)	1467 (18.5)	628 (13.5)	839 (25.6)	< 0.001
Awareness of CVD as the primary cause of death in women	2813 (35.5)	1572 (33.8)	1241 (37.8)	< 0.001

BMI, Body mass index; CVD, Cardiovascular disease; N, Number; SD, Standard deviation.

**Figure 1. Age distribution of female and male respondents.**

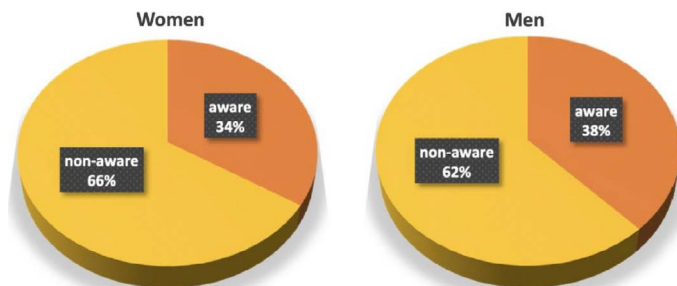
Almost 36% of male and 12% of female respondents were current smokers ($P < 0.001$). In terms of physical activity, 86% of men and 89.5% of women did not engage in regular exercise ($P < 0.001$). Obesity and self-reported hypertension were more frequent in women. Self-reported diabetes mellitus and hyperlipidemia did not differ significantly between the sexes (Table 1).

When asked about the leading cause of death in women, only 34% of female and 38% of male participants correctly identified CVD ($P < 0.001$) (Figure 2). In contrast, 46% of women and 42% of men believed malignancies—particularly breast cancer—were the main cause (Figure 3). Overall, 27% of women and 22% of men selected breast cancer as the major cause, totaling 25% of the entire study population ($n = 2,015$).

Table 2. Comparison of those aware and non-aware of cardiovascular disease as the leading cause of female mortality in each sex according to baseline characteristics of the population

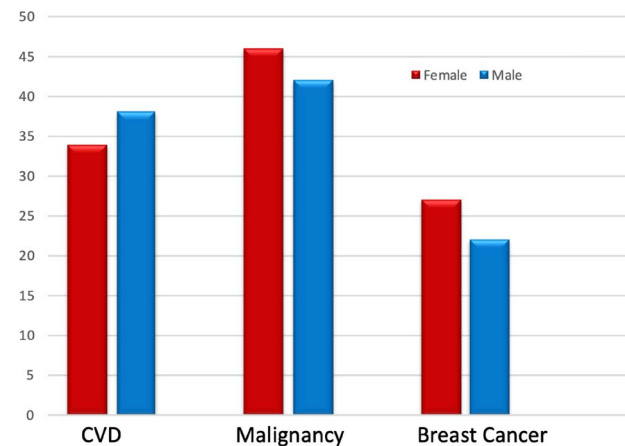
	Female (n = 4,643)			Male (n = 3,277)		
	Aware	Non-Aware	P ^a	Aware	Non-Aware	P ^b
n (%)	1572 (33.8)	3071 (66.1)	0.0001	1241 (37.9)	2036 (62.1)	0.001
Age (years) (mean ± SD)	58.78 ± 11.27	56.73 ± 11.51	0.0001	57.56 ± 11.45	56.74 ± 11.43	0.047
BMI (kg/m ²), (mean ± SD)	28.53 ± 4.72	28.11 ± 4.71	0.004	27.37 ± 3.42	27.40 ± 3.41	0.86
Educational status, n (%)			0.002			0.805
Illiterate	355 (22.5)	580 (18.9)		46 (3.7)	78 (3.8)	
Primary school graduate	690 (43.8)	1326 (43.2)		394 (31.7)	653 (32)	
Secondary/high school graduate	412 (26.2)	871 (28.3)		544 (43.8)	912 (44.8)	
Bachelor's degree or higher	115 (7.3)	294 (9.5)		257 (20.7)	393 (19.3)	
In employment	226 (14.3)	568 (18.5)	0.0001	674 (54.3)	1081 (53.1)	0.261
Cardiovascular risk factors, n (%)						
Hypertension, n (%)	531 (33.7)	1044 (33.9)	0.455	367 (29.5)	615 (30.2)	0.366
Diabetes mellitus, n (%)	139 (8.8)	283 (9.2)	0.706	115 (9.3)	178 (8.7)	0.614
Hyperlipidemia, n (%)	574 (36.5)	1078 (35.1)	0.179	453 (39.7)	766 (37.6)	0.272
Obesity, n (%)	513 (32.6)	919 (29.9)	0.0001	243(19.6)	407 (20)	< 0.001
Smoking, n (%)			0.009			0.607
Non-smoker	1325 (82.3)	2479 (80.7)		540 (43.5)	850 (41.7)	
Ex-smoker	92 (5.9)	205 (6.7)		268 (21.6)	450 (22.1)	
Current smoker	155 (9.9)	387 (12.6)		433 (34.9)	736 (36.1)	
Regular exercise habit, n (%)			0.207			0.976
No-exercise	1421 (90.4)	2733 (89)		1008 (81.2)	1658 (81.4)	
≤ 3 hours/week	125 (8)	292 (9.5)		186 (14.9)	301 (14.8)	
> 3 hours/week	26 (1.7)	46 (1.5)		47 (3.8)	77 (3.8)	
Coronary artery disease, n (%)	245 (15.6)	383 (12.5)	0.002	344 (27.7)	495 (24.3)	0.017

BMI, Body mass index; CVD, Cardiovascular disease; N, Number; SD, Standard deviation. a: P value compares aware vs. non-aware females; b: P value compares aware vs. non-aware males.

**Figure 2. Percentage of individuals for each sex who are aware of cardiovascular disease as the leading cause of female mortality.**

Interestingly, overall educational level was not associated with greater awareness ($P = 0.377$). In gender-stratified analyses, however, a paradox emerged: illiterate women were more aware of CVD as the leading cause of female mortality, while awareness was lowest among university-educated women (Table 2).

With increasing age, participants were more likely to recognize CVD as the leading cause of death in women. This finding was especially pronounced among those over 65 years ($P < 0.001$).

**Figure 3. Presumed causes of death in women, identified by sex.**

In sex-specific analyses, age was significantly correlated with awareness in women ($P < 0.001$) but showed only borderline statistical significance in men ($P = 0.047$).

Subjects with a medical history of coronary artery disease (CAD) were more aware, but having hypertension, diabetes mellitus, or

hyperlipidemia did not increase awareness of CVD as the leading cause of death in women. Obese subjects and non-smoking women were more aware, whereas current-smoking women were less aware. Smoking status did not affect awareness in men, and the reverse was also true (Table 2).

When we explored whether awareness translated into healthier behaviors, the results were less encouraging. Education level, a medical history of CAD, or the presence of CVD risk factors did not appear to motivate risk factor modification. Participants with CAD were less likely to engage in regular exercise. Higher educational attainment did not alter smoking or exercise habits. Hypertensive or diabetic subjects did not exercise more, and patients with CAD did not smoke less. However, those with hyperlipidemia reported more exercise, and people with diabetes or hypertension were somewhat less likely to smoke.

Finally, logistic regression analysis demonstrated that when multiple factors were examined simultaneously, age was the only variable associated with awareness in women, while both age and a personal history of CAD were significantly associated with greater awareness in men.

Discussion

Our nationwide survey documented that public awareness of CVD as the leading cause of death in women is extremely low, with even lower awareness among women themselves. Participants were more likely to identify cancer as the primary cause of female mortality. Neither higher educational attainment nor a history of cardiovascular risk factors was linked to increased awareness. However, logistic regression analysis identified age as the sole factor associated with awareness in women, while both age and a history of CAD were significantly correlated with awareness in men.

Awareness of CVD as the main health problem of women is extremely critical to prevention, timely diagnosis, and appropriate treatment of CVD. Lack of awareness also contributes to resistance against primary preventive measures. The Nurses' Health Study revealed that 82% of ischemic heart disease events were attributable to a lack of adherence to lifestyle measures involving diet, exercise, and smoking.¹¹ Another study indicated that 41% of women did not seek help within the first 12 hours of chest pain onset, likely reflecting a lack of awareness regarding cardiovascular risk in women.¹²

To reduce mortality and morbidity among women, many countries and organizations have launched campaigns to raise awareness of CVD-related deaths in women and periodically assess public awareness levels. However, gender inequality in cardiovascular care remains evident in many parts of the world, a disparity first described as the "Yentl syndrome" in 1991.¹³ Notably, the term Yentl syndrome is derived from the main character in Isaac Bashevis Singer's story, who had to conceal her gender and present herself as a man to receive education.¹⁴ Yentl syndrome highlights the persistent sex bias in the management of CVD.¹³ Women with acute or chronic coronary syndromes, or those presenting with chest pain, are still less likely to undergo coronary angiography or receive coronary revascularization procedures.¹⁵ It appears that women must first present with severe CAD or experience a

myocardial infarction (MI) to receive the same standard of care afforded to men. The core challenge lies in convincing both the public and the medical community that CVD is equally a women's disease.¹³ Since the recognition of this bias, many public awareness initiatives—including Go Red for Women, HER Disease Campaign, #29daysofheart, The Heart Truth Campaign, and Make the Call, Don't Miss a Beat—have been launched in the United States and the European countries to raise awareness of CVD as the number one killer of women.

In Türkiye, there is currently no structured, nationwide campaign or research initiative specifically targeting awareness of CVD in women. Age-adjusted mortality rates for ischemic heart disease, based on the world standard population, demonstrated an upward trend between 2009 and 2019; however, this trend was not statistically significant [annual percentage change (APC) = 1.7 (−0.8; 4.3), $P = 0.166$]. The APC value for women (2.2 [−0.7; 5.2, $P = 0.121$]) was higher compared with men (1.4 [−1.1; 3.9, $P = 0.235$]).¹⁶ Turkish women also exhibit more adverse cardiovascular risk profiles than men, except for smoking.¹⁷ Likewise, treatment goals for low-density lipoprotein (LDL) cholesterol, blood pressure, and blood glucose are less frequently achieved in women with CVD compared with their male counterparts.¹⁸ In addition, both early and one-year mortality following acute MI are almost threefold higher in women than in men (11.2% vs 3.8%, respectively; $P < 0.001$).¹⁸ The results of the Turkish MI (TURKMI) Registry showed that women with ST-segment elevation MI are more likely than men to delay seeking medical attention for chest pain, experience longer total ischemic times, and have higher in-hospital mortality rates.^{19,20} These sex-based disparities have been attributed to a greater burden of comorbidities, delayed treatment, and lower implementation of guideline-recommended therapies in women presenting with acute MI.¹⁹ Our finding that only one-third of female participants were aware that CVD is the leading cause of death in women suggests that low awareness may play a key role in these delays—particularly the prolonged total ischemic time and delay in treatment. This highlights the potential influence of awareness not only on preventive behaviors but also on the urgency with which women seek care during acute cardiovascular events.

Since 1997, the AHA has conducted national surveys to assess women's awareness and understanding of CVD. Between 1997 and 2012, awareness of ischemic heart disease as the leading cause of death among women nearly doubled—from 30% to 56%.⁹ This significant improvement has been largely attributed to the impact of large-scale public awareness campaigns. However, the 2019 AHA survey showed a concerning reversal: awareness declined to 43.7% compared with 64.8% in 2009 ($P < 0.05$). Overall, awareness among women increased steadily from 1997 to 2009, plateaued until 2012, and then declined markedly by 2019.⁹ In Türkiye, historical data are lacking, making comparable trend analyses impossible. Nevertheless, global data highlight the persistent gap in awareness: only 14.4% of women in Chile, 9% in Singapore, and 4% in the United Arab Emirates recognized CVD as the leading cause of female death.^{21,22} Similarly, a nationwide Korean survey reported that almost half of the women surveyed did not consider CVD a significant health concern for women.²¹

The age-adjusted mortality rates from CVD in women are four times higher than those from breast cancer.²³ Despite this, both male and female participants in our survey most frequently cited malignancies—particularly breast cancer—as the leading cause of death in women, with women doing so at a higher rate. This discrepancy between perceived and actual mortality causes is striking. According to data from the Turkish Statistical Institute, CVD accounts for twice as many deaths in women as all malignancies combined.^{24,25} In Türkiye, nationwide awareness campaigns and educational efforts targeting malignant neoplasms, especially breast cancer, have been implemented effectively. Annual diagnostic screening for breast and gastrointestinal cancers is widely encouraged and often supported by health insurance providers. In contrast, there has been no equivalent effort to raise awareness about women's cardiovascular health. Our findings reflect this imbalance: public health messaging around cancer has been effective, while messaging about CVD in women remains insufficient. This disparity likely contributes to widespread misperceptions about the leading cause of female mortality and underscores the urgent need for targeted awareness campaigns focused on CVD.

Interestingly, our study did not demonstrate a positive association between educational attainment and awareness of CVD mortality in women, contrary to findings from both the Korean nationwide survey²¹ and the 2019 AHA survey,⁹ which reported that lower educational levels were independently associated with reduced awareness. This discrepancy may point to limitations within the Turkish education system in fostering functional health literacy. Indeed, a prior study found that only 28% of Turkish adults possessed adequate health literacy, highlighting the need to prioritize health literacy initiatives in Türkiye.²⁶ Notably, in our study, illiterate women demonstrated higher levels of awareness compared to university-educated women. This controversial finding may be attributed to age differences: the mean age of illiterate women was 64.7 ± 8.93 years, while that of literate women was significantly lower at 55.6 ± 11.3 years. A similar age gap was observed among men; illiterate men were older (65.1 ± 10 years) than their literate counterparts (56.7 ± 11.4 years). Among men, cumulative educational attainment was not associated with awareness levels. Logistic regression analysis further confirmed that age was the only independent correlate of awareness in women, while both age and a history of CAD were significantly associated with awareness in men. These findings suggest that, in Türkiye, awareness of CVD as the leading cause of female mortality is likely driven more by lived experience and personal observation—particularly among older individuals—than by formal education. Another important finding in our population is the higher awareness we observed among individuals over 65 years of age in both sexes. Similarly, the marked decline in CVD awareness among women in the AHA survey between 2009 and 2019, affecting all racial, ethnic, and demographic groups, did not occur in those aged ≥ 65 years.⁹ These parallel findings emphasize the need for renewed, age-targeted educational efforts, particularly for younger women and high-risk populations.

Interestingly, we did not observe any relationship between awareness of CVD mortality in women and the presence of traditional cardiovascular risk factors such as hypertension, diabetes mellitus, or hyperlipidemia, consistent with the findings of the

2019 AHA survey.⁹ Only a personal history of CAD was significantly associated with increased awareness. These findings suggest that individuals may only recognize the cardiovascular threat to women after experiencing or witnessing a major clinical event. The VIRGO study (The Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients) further supports this interpretation, showing that physicians were less likely to inform women of their CVD risk or to discuss preventive strategies.²⁷ Overall, these results indicate a broader failure in risk communication, particularly at the level of primary prevention, and emphasize the importance of proactive, sex-specific education and counseling in routine care.

Our results underscore the urgent need to implement national action plans aimed at increasing public awareness of CVD as the leading cause of death in women. A dedicated, large-scale public awareness campaign focused on women's cardiovascular health could play a pivotal role in reducing the high burden of female cardiovascular mortality in Türkiye. Equally important is the active involvement of healthcare professionals, who should be encouraged and supported to engage in regular, evidence-based risk communication—especially with women at elevated risk. Finally, integrating health literacy education into school curricula may provide long-term, population-level benefits by equipping individuals with the tools to understand and act on cardiovascular health risks early in life.

Strengths and Limitations

Our study has several important strengths. First, it was conducted across all provinces of Türkiye, ensuring broad national representation. The large sample size and inclusion of participants from a wide range of educational and literacy backgrounds enhanced the generalizability of the findings. Notably, the use of face-to-face interviews allowed for the participation of illiterate individuals, improving inclusivity and reducing sampling bias.

However, certain limitations must be acknowledged. The questionnaire, although developed by an expert cardiologist with experience in epidemiology and survey methodology, was not subjected to formal validation in an independent population. While it was reviewed for face validity and pilot-tested, the absence of full psychometric validation may affect interpretability and limit its generalizability.

In addition, the survey relied on self-reported data for comorbid conditions and lifestyle behaviors, which may be subject to recall or reporting bias. Furthermore, the study did not collect socioeconomic or region-specific data, and awareness of CVD as the leading cause of death in men was not assessed. Therefore, comparisons between male and female awareness levels should be interpreted with caution.

Despite these limitations, to the best of our knowledge, this is the first nationwide study in Türkiye to investigate public awareness of CVD as the leading cause of death among women, highlighting a critical gap in national cardiovascular health literacy.

Conclusion

The findings of this survey reveal alarmingly low public awareness of CVD as the leading cause of death in women, a gap that persists across both genders. Surprisingly, neither higher educational attainment nor a history of cardiovascular risk factors was associated with greater awareness. Instead, age emerged as the only factor

significantly associated with awareness in women, while both age and a history of CAD were correlated with awareness in men. These results suggest that awareness of female mortality causes may arise more from personal experiences than from formal education, underscoring a potential gap in health literacy.

Collectively, these findings highlight the urgent need for targeted public awareness campaigns addressing CVD as the leading cause of death among women in Türkiye. Furthermore, we advocate for the integration of health literacy into school curricula. Equipping individuals—particularly women—with the knowledge and skills to make informed decisions about their cardiovascular health is essential for improving outcomes and reducing preventable mortality.

Ethics Committee Approval: Ethics committee approval was obtained from Koşuyolu High Specialty Research and Training Hospital Clinical Trials Ethics Committee (Approval Number: 2023/18/747, Date: 21.11.2023).

Informed Consent: Informed consent was obtained from all participants.

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