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Prevalence and associated factors of self-reported ischaemic heart disease and/or stroke: a cross-sectional nationally representative community-based study of adults in Malawi in 2017

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ABSTRACT

Objective This study aimed to assess the prevalence and associated factors of self-reported ischaemic heart disease (IHD) and/or stroke among adults in Malawi.

Design Population-based cross-sectional study.

Setting Nationally representative sample of general adult population in Malawi.

Participants The sample included 4187 persons aged 18–69 years (32 years of median age) that participated in the '2017 Malawi STEPwise Approach to Non-Communicable Disease Risk-Factor Surveillance survey.'

Primary and secondary outcome measures Self-reported history of IHD and/or stroke, along with biological, behavioural, psychosocial stress and sociodemographic covariates. Multivariable logistic regression calculated OR with 95% CI for IHD and/or stroke.

Results The prevalence of IHD and/or stroke was 6.5%, 4.4% among men and 8.4% among women. In adjusted logistic regression analysis, older age (50–69 years) (adjusted OR (AOR) 3.49, 95% CI 1.75 to 6.94), female sex (AOR 2.09, 95% CI 1.45 to 3.01), Chewa speaking (AOR 4.62, 95% CI 1.32 to 16.22), English speaking (AOR 5.63, 95% CI 1.43 to 22.19), suicidal ideation, plan and/or attempt (AOR 1.87, 95% CI 1.11 to 3.13) and sedentary behaviour (AOR 2.00, 95% CI 1.12 to 3.59) were associated with IHD and/or stroke. In addition, in unadjusted analysis, non-paid or unemployed, urban residence, overweight, obesity and having hypertension were associated with IHD and/or stroke.

Conclusions Almost 1 in 10 women and 1 in 20 men aged 18–69 years had IHD and/or stroke in Malawi. Several risk and protective factors were found that can be targeted in population health interventions.

Strengths and limitations of this study

- The study used a large nationally representative community-based sample of 4187 adults in Malawi.
- A large number of covariates, including sociodemographic factors, psychosocial stress, biological and behavioural risk factors of ischaemic heart disease (IHD) and/or stroke were incorporated in the final adjusted logistic regression model.
- The study assessed IHD and/or stroke by self-report, which may bias the IHD and/or stroke prevalence.
- Length of IHD and/or stroke diagnosis and cardiovascular disease type were not assessed.

BACKGROUND

It is 'estimated that 17.9 million people died from cardiovascular diseases (CVDs) in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke,' and three quarters occur in low-income and middle-income countries.[1] In older persons in 2019, 'ischaemic heart disease (IHD) and stroke were the top-ranked causes of disability-adjusted life-years.'[2] 'Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain.'[1]

In studies in low-income and middle-income countries, in urban–rural sites (35–70 years) in South Africa, Tanzania and Zimbabwe, the proportion of self-reported CVD (SRCVD) was 4.7%, 5.1% and 5.7%, respectively.[3] In national studies, for example, in Brazil, 1.6% (≥18 years) had self-reported (SR) stroke,[4] in Ghana, 2.8% and 13.1% (≥50 years) had SR stroke and angina, respectively,[5] in Nepal, 2% (24–64 years) had IHD and/or stroke,[6] in China, 3.3% and 3.6% (35–74 years),[7] in Thailand, 1.5% and 1.7% (35–74 years) had SRCVD in men and women, respectively,[7] and in Iran, 5.3% (20–69 years) had self-reported coronary heart disease (CHD).[8] We were unable to identify national studies on SRCVD in Malawi, a low-income country in Southern Africa.[9] One in 10 persons (10%) died from CVDs in 2016 in Malawi.[10] It has been estimated that rheumatic heart disease (with a prevalence of 183 200 cases) is a major public health problem in Malawi.[9] In a hospital-based

study in Northern Malawi, 'out of the 3908 new Malawian patients included in the 5-year period register, 34% had valvular heart disease (mainly rheumatic heart disease); 24%, hypertensive heart disease; 19%, cardiomyopathies and 14%, pericardial diseases.'.[10]

Factors that increase the risk of SRCVD include sociodemographic, behavioural and biological variables. Socio and demographic factors increasing the odds of SRCVD include advanced age,[8 11 12] sex,[8 11–13] lower socioeconomic status,[4 11–14] urban residence[8] and ethnic group.[15] Behavioural variables increasing the odds of SRCVD include tobacco use,[12 16] low physical activity,[4 17] poor diet (low fruit/vegetable intake,[6 17] and salt consumption[18 19]) and mental distress.[20–22] Biological variables increased the odds of SRCVD include hypertension,[8 12 14–17 23 24] diabetes,[4 12 14–17 23] obesity[4 14 16 17 23] and abnormal cholesterol values.[8 13] This study aimed to determine the prevalence and correlates of IHD and/or stroke in a national community-based study among adults in Malawi in 2017.

METHOD

Sample and procedure

The study analysed data from persons that participated in the nationally representative cross-sectional '2017 Malawi STEPwise Approach to Non-Communicable Disease Risk-Factor Surveillance (STEPS) survey'.[25] Using a multistage cluster sampling approach, the survey generated nationally representative community-based data for adults (18–69 years) in Malawi.[25] Inclusion criteria were one adult household member aged 18–69 per household who was able to provide informed consent.[25] More information on the study methods and the data can be publicly accessed.[25]

Measures

Outcome variable: History of IHD and/or stroke was sourced from the item, 'Have you ever had a heart attack or chest pain from heart disease (angina) or a stroke (cerebrovascular accident or incident)?' (Yes, No).[25]

Social and demographic variables consisted of educational level, sex, age, employment and marital status, residence and language of interview.[25]

Psychosocial stress included past 12-month suicidal ideation, suicide plan and attempt, and history of a family member attempting suicide. 'Alcohol family problems' was measured with the question, 'During the past 12 months, have you had family problems or problems with your partner due to someone else's drinking?' ('1=yes: >monthly to 4=once or twice').[25]

Biological variables consisted of measured body mass index classified as '<18.5 kg/m^2 underweight, 18.5–24.4 kg/m^2 normal weight, 25–29.9 kg/m^2 overweight and ≥30 kg/m^2 obesity.'[26] Hypertension/raised blood pressure (BP) was classified as 'systolic BP ≥140 mm Hg and/or diastolic BP ≥90 mm Hg or where the participant is currently on antihypertensive medication.'[27] Diabetes was classified as 'fasting plasma glucose levels ≥7.0 mmol/L (126 mg/dL); or using insulin or oral hypoglycaemic drugs; or having a history of diagnosis of diabetes.'[28] Raised total cholesterol (TC) was defined as 'fasting TC ≥5.0 mmol/L or currently on medication for raised cholesterol.'.[28]

Table 1 Sample and self-reported ischaemic heart disease (IHD) and/or stroke characteristics among adults in Malawi, 2017: sociodemographic factors and psychosocial stress

	Sample	Self-reported IHD and/or stroke
Variable	N (%)	N (%)
Sociodemographic factors		
All	4187	312 (6.5)
Age (years)		
18–29	1371 (45.5)	71 (4.5)
30–49	1890 (39.7)	136 (6.8)
50–69	926 (14.7)	105 (11.9)
Sex		
Male	1485 (35.5)	69 (4.4)
Female	2702 (64.5)	243 (8.4)
Education		
Secondary or more	1057 (24.7)	81 (7.1)
Standard 5–8	1227 (34.0)	89 (6.6)
Standard 1–4	1318 (31.1)	101 (5.8)
None	581 (10.0)	40 (6.6)
Marital status		
Never married	418 (14.4)	29 (4.7)
Married/cohabiting	2888 (73.0)	209 (6.7)
Separated/divorced/widowed	866 (12.6)	74 (7.6)
Employment status		
Non-paid or unemployed	2329 (56.2)	193 (7.6)
Employed or student	1756 (43.8)	116 (5.3)
Residence		
Rural	3343 (89.1)	236 (6.1)
Urban	844 (10.9)	76 (10.0)
Language of interview		
Tumbuka	145 (4.3)	7 (2.3)
Chewa	3535 (78.3)	243 (6.1)
English	506 (17.5)	62 (9.3)
Psychosocial stress		
Alcohol family problem		
No	3893 (91.7)	287 (6.5)
Yes	294 (8.3)	25 (6.6)
Family member attempted suicide		
No	3975 (94.6)	290 (6.4)
Yes	172 (5.4)	18 (8.7)
Suicidal ideation/plan/attempt		
No	3797 (92.1)	264 (6.0)
Yes	331 (7.9)	45 (11.6)

Table 2 Sample and self-reported ischaemic heart disease (IHD) and/or stroke characteristics among adults in Malawi, 2017: biological and behavioural risk factors

	Sample	Self-reported IHD and/or stroke
Variable	N (%)	N (%)
Biological risk factors		
Body mass index		
Normal	2756 (73.0)	176 (5.8)
Underweight	277 (8.5)	23 (6.0)
Overweight	655 (13.5)	67 (9.4)
Obesity	319 (5.0)	39 (12.1)
Hypertension		
No	3450 (83.9)	229 (6.1)
Yes	727 (16.1)	83 (8.7)
Diabetes status		
No	3590 (97.0)	272 (6.8)
Pre-diabetes	103 (1.7)	7 (5.7)
Diabetes	73 (1.3)	5 (2.7)
Raised total cholesterol		
No	3393 (91.8)	245 (6.7)
Yes	457 (8.2)	47 (6.3)
Behavioural risk factors		
Smoking		
Never	3639 (84.1)	279 (6.7)
Past	188 (4.6)	19 (8.6)
Current	360 (11.2)	14 (3.9)
Passive smoking		
No	3487 (79.3)	243 (6.2)
Yes	700 (20.7)	69 (7.7)
Alcohol dependence		
No	4035 (95.0)	305 (6.7)
Yes	152 (5.0)	7 (2.8)
Sedentary behaviour		
No	3351 (94.4)	266 (6.8)
Yes	233 (5.6)	31 (11.3)
No active transportation		
No	3822 (92.0)	281 (6.2)
Yes	365 (8.0)	31 (10.1)
Salt intake		
Never/rarely/sometimes	3494 (82.6)	268 (6.9)
Often/always	685 (17.4)	44 (4.4)
Fruit/vegetable intake/day		
5 or more servings	518 (9.6)	28 (6.1)
<5 servings	3669 (90.4)	284 (6.5)

Behavioural variables consisted of tobacco use, exposure to past month secondary smoking, daily servings of fruit and vegetable intake, and sedentary behaviour (≥7 hours/day) and no active transportation (measured with the 'Global Physical Activity Questionnaire'[25 29]). Salt consumption was sourced from the question, 'Do you add salt to food at the table?',[25] and dichotomised into '0=never, rarely or sometimes, and 1=often or always.' Alcohol dependence was defined as ≥4 total scores (items 4–6) from the 'Alcohol Use Disorder Identification Test (AUDIT)'.[30]

Patient and public involvement

The research questions assessed used existing data taken from large representative survey, 'STEPS', which contained more health questions and health measures than those presented in this work. Participants were not involved in the design of the study, recruitment or conduct of the study. STEPS participants receive their results from their physical and biochemical measurements. The study did not enlist participant opinion during study design but did have a plan to provide results to participants on physical blood measurements.

Data analysis

Statistical analyses were conducted with 'STATA software V.14.0 (Stata),' by considering the complex study approach. Logistic regression was used to estimate associations between independent variables and IHD and/or stroke (dependent variable). The adjusted logistic regression model included all variables that were significant at p<0.1 in unadjusted analyses. Missing values were excluded, and p<0.05 was considered significant.

RESULTS

Sample and IHD and/or stroke prevalence characteristics

In all, 4187 persons (18–69 years, median 32, IQR 18), and 35.6% were male. Further, sociodemographic and psychosocial stress information is shown in table 1. In terms of biological variables, 18.5% of participants were overweight or obese, 16.1% had hypertension, 1.7% prediabetes, 1.3% diabetes and 8.2% raised TC. Regarding behavioural risk factors, 4.6% were past and 11.2% current smokers, 20.7% had past 1 month exposure to secondary smoke, 5.0% were dependent on alcohol, 17.4% had often or always salt with their meals, 90.4% consumed insufficient fruit/vegetables, 5.6% engaged in sedentary behaviour and 8.0% did not participate in active transportation. The prevalence of IHD and/or stroke was 6.5%, 8.4% among women and 4.4% among men (see tables 1 and 2).

Associations with self-reported IHD and/or stroke prevalence

In adjusted logistic regression analysis, older age (50–69 years) (adjusted OR (AOR) 3.49, 95% CI 1.75 to 6.94), female sex (AOR 2.09, 95% CI 1.45 to 3.01), Chewa speaking (AOR 4.62, 95% CI 1.32 to 16.22), English speaking (AOR 5.63, 95% CI 1.43 to 22.19), suicidal ideation, plan and/or attempt (AOR 1.87, 95% CI 1.11 to 3.13) and sedentary behaviour (AOR 2.00, 95% CI 1.12 to 3.59) were associated

Table 3 Univariate and multivariable associations with self-reported ischaemic heart disease and/or stroke: sociodemographic factors and psychosocial stress

Variable	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Sociodemographic factors				
Age (years)				
18–29	1 (Reference)		1 (Reference)	
30–49	1.56 (1.01 to 2.41)	0.047	1.83 (1.09 to 3.08)	0.023
50–69	2.88 (1.64 to 5.05)	<0.001	3.49 (1.75 to 6.94)	<0.001
Sex				
Male	1 (Reference)		1 (Reference)	
Female	1.99 (1.41 to 2.82)	<0.001	2.09 (1.45 to 3.01)	<0.001
Education				
Secondary or more	1 (Reference)		-	
Standard 5–8	0.93 (0.49 to 1.75)	0.816		
Standard 1–4	0.73 (0.41 to 1.32)	0.295		
None	0.66 (0.29 to 1.52)	0.329		
Marital status				
Never married	1 (Reference)		-	
Married/cohabiting	1.46 (0.73 to 2.94)	0.284		
Separated/divorced/widowed	1.67 (0.85 to 3.28)	0.139		
Employment status				
Non-paid or unemployed	1 (Reference)		1 (Reference)	
Employed or student	0.68 (0.48 to 0.97)	0.035	0.80 (0.53 to 1.22)	0.3
Residence				
Rural	1 (Reference)		1 (Reference)	
Urban	1.72 (1.02 to 2.89)	0.04	1.23 (0.74 to 2.04)	0.43
Language of interview				
Tumbuka	1 (Reference)		1 (Reference)	
Chewa	2.74 (0.81 to 9.31)	0.106	4.62 (1.32 to 16.22)	0.017
English	4.30 (1.24 to 14.88)	0.022	5.63 (1.43 to 22.19)	0.014
Psychosocial stress				
Alcohol family problem				
No	1 (Reference)		-	
Yes	1.03 (0.57 to 1.85)	0.928		
Family member attempted suicide				
No	1 (Reference)		-	
Yes	1.41 (0.66 to 2.98)	0.372		
Suicidal ideation/plan/attempt				
No	1 (Reference)		1 (Reference)	
Yes	2.05 (1.27 to 3.31)	0.003	1.87 (1.11 to 3.13)	0.018

OR, Odds Ratio.

with IHD and/or stroke. In addition, in unadjusted analysis, non-paid or unemployed, urban residence, overweight, obesity and having hypertension were associated with IHD and/or stroke (see tables 3 and 4).

DISCUSSION

This is the first national study investigating the prevalence and correlates of IHD and/or stroke in Malawi. We found a high prevalence of IHD and/or stroke (6.5%), and associated factors included older age, female sex, Chewa speaking, English speaking, suicidal ideation, plan and/or attempt and sedentary behaviour, and in unadjusted analysis, urban residence, overweight, obesity and having hypertension. The found prevalence of IHD and/or stroke in Malawi (6.5%, 18–69 years) was higher than among 35–70 years in South Africa (4.7%), Tanzania (5.1%) and Zimbabwe (5.7%),[3]

Table 4 Univariate and multivariable associations with self-reported ischaemic heart disease and/or stroke: biological and behavioural risk factors

Variable	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Biological risk factors				
Body mass index				
Normal	1 (Reference)		1 (Reference)	
Underweight	1.04 (0.50 to 2.13)	0.923	1.03 (0.50 to 2.13)	0.938
Overweight	1.67 (1.05 to 2.67)	0.032	1.20 (0.75 to 1.92)	0.451
Obesity	2.23 (1.19 to 4.17)	0.012	1.40 (0.73 to 2.69)	0.309
Hypertension				
No	1 (Reference)		1 (Reference)	
Yes	1.47 (1.01 to 2.15)	0.044	1.04 (0.69 to 1.59)	0.839
Diabetes status				
No	1 (Reference)		-	
Pre-diabetes	0.83 (0.31 to 2.26)	0.722		
Diabetes	0.38 (0.13 to 1.12)	0.079		
Raised total cholesterol				
No	1 (Reference)		-	
Yes	0.93 (0.51 to 1.70)	0.812		
Behavioural risk factors				
Smoking				
Never	1 (Reference)		-	
Past	1.30 (0.61 to 2.75)	0.496		
Current	0.57 (0.25 to 1.31)	0.183		
Passive smoking				
No	1 (Reference)		-	
Yes	1.26 (0.81 to 1.96)	0.296		
Alcohol dependence				
No	1 (Reference)		-	
Yes	0.41 (0.14 to 1.20)	0.103		
Sedentary behaviour				
No	1 (Reference)		1 (Reference)	
Yes	1.76 (0.99 to 3.13)	0.055	2.00 (1.12 to 3.59)	0.019
No active transportation				
No	1 (Reference)			
Yes	1.71 (0.67 to 4.34)	0.259	-	
Salt intake				
Never/rarely/sometimes	1 (Reference)			
Often/always	0.62 (0.34 to 1.12)	0.115	-	
Fruit/vegetable intake/day				
5 or more servings	1 (Reference)			
<5 servings	1.08 (0.59 to 1.98)	0.765		

OR, Odds Ratio.

in Nepal (24–64 years; 2%),[6] in Brazil (≥18 years; 1.6% SR stroke),[4] in China (35–74 years; <3.5%),[7] in Thailand (35–74 years; 1.5% in men and 1.7% in women)[7] and in Iran (20–69 years; 5.3% CHD).[8]

In line with other studies,[8 11 12] advanced (45–69 years) increased the odds of IHD and/or stroke. In agreement with some studies, in particular in Africa,[8 13] the IHD and/or stroke prevalence was in this study significantly

higher in women than in men. Compared with Tumbuka speaking participants, Chewa and English-speaking participants had a higher odd of IHD and/or stroke. This result may confirm that ethnicity contributes to higher IHD and/or stroke, as found in a study in Singapore.[15] In line with previous research,[8] this study found in unadjusted analysis that urban residence was associated with a higher prevalence of IHD and/or stroke. Some research showed that low socioeconomic status,[13 14] was associated with IHD and/or stroke, while in this study in unadjusted analysis non-paid or unemployed work status was associated with IHD and/or stroke. A few studies showed that lower education was associated with SRCVD,[4 11 12] while we did not find significant differences in relation to educational level in this study.

Consistent with former studies,[20–22] this survey found that suicidal behaviour (as a form of psychosocial stress) increased the odds of IHD and/or stroke. 'Stress can increase the cerebrovascular disease risk by modulating symphaticomimetic activity, affecting the BP reactivity, cerebral endothelium, coagulation or heart rhythm.'.[22] Consistent with previous research,[4 17] this study showed that sedentary behaviour increased the odds of IHD and/or stroke. Contrary to expectation,[4 6 16–19] smoking, frequent salt and insufficient fruit/vegetable intake were not significantly associated with IHD and/or stroke in this survey.

In line with previous research,[4 8 12 14–17 23 24] this survey found in unadjusted analyses associations between overweight/obesity, hypertension and IHD and/or stroke. Unlike some studies,[4 8 12 14–17 23] this survey did not show associations between raised TC, pre-diabetes, diabetes and IHD and/or stroke. It is possible that because of the low prevalence of pre-diabetes and diabetes (<2%) no significant association with IHD and/or stroke was found.

The high prevalence of IHD and/or stroke found in Malawi emphasises the need for large community-based education operations, strengthening local health systems and providing Developmental Assistance for Health.[13 16 31] Considering that suicidal behaviour (as a form of psychosocial stress) was associated with IHD and/or stroke in this study, CVD screening and management may want to include screening for psychosocial stress. Primary prevention should be the main approach to reduce CVDs in Malawi,[32] including as found in this study reducing sedentary behaviour, hypertension and preventing overweight/obesity and psychological distress.[20–22] Although Malawi has 'evidence-based national guidelines/protocols/standards for the management of major non-communicable diseases (NCDs) through a primary care approach,' there is a lack of an 'operational policy, strategy or action plan to reduce unhealthy diet and/or promote healthy diets and to reduce physical inactivity and/or promote physical activity'.[15 33] In addition to 'facility-based NCD screening and clinical services, active screening, prevention and community awareness and outreach' should be added.[34]

The study strengths include the use of a large nationally representative sample, information related to several confounders, and uniform STEPS measures and methods. Study limitations consist of the STEPS survey only being cross-sectional, which hinders us to draw causative conclusions. Furthermore, some variables, including IHD and/or stroke, were assessed by self-report. However, SRCVD has been found 'valid for epidemiological studies'.[35] Our estimates of IHD and/or stroke are likely to be an underestimate since the study excluded those with IHD and/or stroke who had died prior to the survey.[36] Future studies could measure the length of IHD and/or stroke and the CVD type.

CONCLUSION

Almost 1 in 10 women and 1 in 20 men aged 18–69 years had IHD and/or stroke in Malawi. Several associated factors for IHD and/or stroke, such as older age, female sex, Chewa or English speaking, suicidal ideation, plan and/or attempt and sedentary behaviour, were found that can be targeted in population health interventions.

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Patient consent for publication Not applicable.

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