

Socio-demographic correlates of unhealthy lifestyle in Ethiopia: a secondary analysis of a national survey

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Abstract

This study aimed to assess socio-demographic correlates of unhealthy lifestyles among adolescents and adults in Ethiopia. A population-based national cross-sectional survey using the WHO NCD STEPS instruments was conducted. Data were collected in 2015, from a total of 9,800 participants aged between 15 and 69 years. Unhealthy lifestyle scores (0 [most healthy] to 5 [most unhealthy]) were determined based on diet (daily fruit and vegetable consumption), smoking status, overweight/obesity, alcohol intake, and physical activity. A co-occurrence of 3 or more unhealthy lifestyles was considered as an unhealthy lifestyle. The study found that 98.2% of participants had low consumptions of fruit and vegetables, 5.4% smoked tobacco, 15.0% consumed excessive alcohol, 66.0% had inadequate physical activity and 2.3% were obese. One in eight (13%) participants were having three or more unhealthy lifestyles. We found that male sex, urban residence, older age, being married or living in common-law, and higher income were associated with unhealthy lifestyles. Participants with higher educational status had lower odds of unhealthy lifestyles. Socio-demographic characteristics such as sex, age, marital status, residence, income, and educational status were correlated with individuals' lifestyles. Tailored interventions that target specific socio-demographic groups are required to address the increasing burden of unhealthy lifestyles in Ethiopia.

Introduction

Cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes are the most common type of NCDs accounting for 80% of premature NCD-related deaths (1) and contributing to more than 41 million deaths due to NCD-related causes every year (2, 3). The burden of NCDs has increased by almost 14% since 2005 and has created major concerns for society and governments. Low-and middle-income countries (LMICs) are highly affected, accounting for almost 77% of all deaths and 85% of premature deaths (aged 30–69 years) (2).

The burden of NCDs poses social, economic, and health inequality disproportionately affecting poor communities. The adverse consequences of NCDs are more pronounced in LMICs (4) due to the double burden of infectious diseases and weak healthcare systems (5, 6). Tobacco use, harmful use of alcohol, physical inactivity, and unhealthy diet are the four most common modifiable lifestyle risk factors that have been shown to increase the risk of NCDs (7). Each year, tobacco accounts for over 7.2 million deaths, excess salt or sodium intake accounts for 4.1 million deaths, 3.3 million deaths attributed to harmful use of alcohol, and 1.6 million deaths attributed to insufficient physical activity (8). Metabolic risk factors including overweight and obesity elevated blood pressure and raised blood glucose are associated with these modifiable lifestyle risk factors and contribute to the risk of developing NCDs (7, 8). Consequently, global efforts to control NCD focuses on addressing these lifestyle factors (2).

The sustainable development goal (SDG) target 3.4 aims to reduce NCD-related premature death by one-third by 2030 (9). In line with this goal, Ethiopia set targets to reduce NCD-related premature deaths by 12.5% (10). Though deaths due to NCDs were reduced by 37% between 1990 and 2015 in Ethiopia,

knowledge regarding the burden of unhealthy lifestyle factors and their association with socio-demographic and metabolic factors is limited (11). This reflects that the national strategies require full implementation of interventions and need to prioritize people with unhealthy lifestyle factors associated with NCDs.

The evidence for the benefit of healthy behaviours on reducing NCDs is well established (12–14). Multiple lifestyle risk factors are more likely to have a stronger association with NCDs than a single lifestyle-related factor. Hence, it would be of special interest to combine all the major lifestyle risk factors and determine an individual's overall unhealthy lifestyle so that individuals at significant risk for NCDs could be targeted and included in the intervention programs (15). Understanding socio-demographic factors, such as income inequality, with unhealthy lifestyles, has recently attracted more attention (16–18). Targeting socio-demographic groups with multiple unhealthy lifestyles could be a cost-effective strategy to prioritize NCD prevention interventions (19, 20). However, no study, to our knowledge, has shown the socio-demographic correlates of multiple unhealthy lifestyles in Ethiopia. Therefore, this study aimed at determining the prevalence of unhealthy lifestyles and their association with socio-demographic groups. In addition, we also assessed the association of unhealthy lifestyles with diabetes and hypertension.

Methods

Data source

Individual-level data collected from a community-based cross-sectional survey were used. The survey was collected in 2015 by the Ethiopian Public Health Institute in collaboration with the Federal Ethiopian Ministry of Health (FMOH) and World Health Organization (WHO) using the NCD STEPS instrument (21). The STEPS survey methods are described in detail elsewhere (22). Briefly, the survey was conducted among 9,800 adolescents and adults aged between 15 and 69 years. The survey contains information about the socio-demographic and behavioural characteristics (STEP I); physical measurements for blood pressure, overweight, and obesity were calculated (STEP II); and included biochemical measurement for diabetes, raised blood glucose, and abnormal lipid level (STEP III).

Sociodemographic characteristics

Sociodemographic data such as age (15–29, 30–44, 45–59, and 60–69 years), sex, residence (urban or rural), education (no formal schooling, primary school completed, secondary school completed, and college/University completed), marital status (single, married, and common-law), and income (\leq 12,000, 12,000–23,299, \geq 23,300 Birr) were assessed. Participants were recruited from all administrative regions of Ethiopia.

Unhealthy lifestyle score

Based on previous studies (23), insufficient physical activity, tobacco use, excessive intake of alcohol, and inadequate serving of fruit and vegetable intake, and overweight/obesity were used to construct

unhealthy lifestyle scores as an outcome variable.

Insufficient physical activity

Physical activity was assessed based on the total time spent on physical activity per day at work, including transport and recreational settings. It was measured using the metabolic equivalent time (MET) in minutes per week spent in physical activity. According to the WHO recommendation on physical activity, performing an equivalent combination of moderate- and vigorous-intensity physical activity below 600 MET-minutes per week was considered as insufficient physical activity (24).

Excessive alcohol intake

Alcohol consumption was measured in terms of current and previous drinking (i.e., ever or within 12 months of the interview period) using the concept of a standard drink i.e., any drink containing about 10g of pure alcohol. Men who reported four or more standard units per day and women who reported three and more standard units per day “ever” or within the last 12 months were classified as having excessive use of alcohol (25).

Current smoking

Tobacco use was assessed in terms of current and previous smoking status, duration of smoking, the quantity of tobacco use, smokeless tobacco use, and exposure to second-hand smoking. Respondents who replied, ‘Yes’ for the question “do you smoke cigarettes (any tobacco product)?” were categorized as “current tobacco users”.

Dietary intake

fruit and vegetable intake were used as a surrogate variable for overall dietary quality as there was no comprehensive data on dietary intake. Consumption of fruit and vegetables was assessed in terms of the number of servings, with a serving being equal to 400g (26). Participants who reported consumptions of less than five servings of fruit or vegetables per day during the last 30 days of the interview were considered as having a suboptimal diet (27).

Metabolic factors

Overweight/obesity

a respondent's height (cm) and weight (kg) measurements were taken to calculate body mass index (BMI). BMI was calculated as the respondent's weight in kilograms divided by the square of the respondent's height in meters (kg/m^2). Participants with BMI 25-29.9 and $\geq 30 \text{ kg}/\text{m}^2$ were classified as overweight and obese, respectively.

The unhealthy lifestyle scores for each participant were calculated as the sum of the five indicators and possible scores ranged from 0 (lowest unhealthy score) to 5 (highest unhealthy score). The highest

scores represent the extent of co-occurrence of risk factors. We defined an unhealthy lifestyle as co-occurrence of 3 or more risk factors. Since most (around three in four) of the respondents were from the rural area of Ethiopia, many of the participants could have at least two unhealthy lifestyle risk factors due to the following reasons: (i) home-made beer-like traditional alcohol (called *Tela*) intake is common in rural areas and (ii) knowledge of nutrition and dietary diversity are low in rural residents (28).

Diabetes: Blood glucose measurements were taken to assess diabetes. Diabetes was defined as fasting plasma glucose value: ≥ 7.0 mmol/L (126 mg/dl) or currently taking medication/s for diabetes.

High blood pressure

Both systolic (SBP) and diastolic (DBP) blood pressure were measured three times and the mean values were taken for this analysis. High blood pressure was defined as SBP ≥ 140 mmHg and/or DBP ≥ 90 , or currently taking medication for high blood pressure.

Statistical analysis

Demographic characteristics were summarised using proportion (categorical variables), mean and SD (continuous and symmetrically distributed data), or median and interquartile ranges (25th and 75th percentiles) for (continuous and asymmetric data). Bivariable and multivariable logistic regression models were used to determine the association of socio-demographic factors with unhealthy lifestyle using crude and adjusted odds ratio (OR) and 95% confidence interval (CI). A p-value < 0.05 is considered statistically significant for the association between socio-demographic factors and co-occurrence of unhealthy NCD lifestyle risk factors. Data management and analysis were performed using Stata version 16 (StataCorp LLC, College Station, TX) and R (version 3.6.3, R Foundation for Statistical Computing, Vienna, Austria). All methods were carried out in accordance with the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines (29).

Results

A total of 9,800 participants were included in the analysis with a response rate of 95.5%. Three in five participants were females (59.4%), 78.8% did not attend formal schooling and 72.6% were rural residents. The median age of the study participants was 32 years (25th and 75th percentile: 25, 44 y). Two-thirds of the participants (66.0%) had insufficient physical activity per week, 15.3% were classified as they drank excess alcohol per day based on their response and 5.4% of participants were current smokers. Almost all had inadequate fruit and vegetable intake (98.2%) and 10% were overweight/obese. There were significant differences in the prevalence of almost all unhealthy behaviours across sociodemographic characteristics (Table 1).

Table 1

Socio-demographic characteristics of the study participant and unhealthy lifestyle factors in Ethiopia

Variables	Unhealthy lifestyle factors					
	Total sample n (%)	Insufficient physical activity	Excessive alcohol intake	Current smoking	Low fruit & vegetable intake	Overweight and Obesity
<i>Residence (N = 9,800)</i>		<i>p = 0.023</i>	<i>p = 0.01</i>	<i>p = 0.00</i>	<i>p = 0.76</i>	<i>p < 0.00</i>
Rural	7,113 (72.7)	4,428 (65.3)	1,099 (16.0)	421 (6.0)	6,923 (98.0)	322 (4.9)
<i>Sex (N = 9,800)</i>		<i>p < 0.00</i>	<i>p < 0.00</i>	<i>p < 0.00</i>	<i>p = 0.08 ()</i>	<i>p < 0.00</i>
Female	5,823 (59.4)	3,618 (68)	498 (9.0)	79 (1.4)	5,640 (98.0)	686 (12.8)
<i>Age groups in years (N = 9,800)</i>		<i>p < 0.001</i>	<i>p < 0.00</i>	<i>p < 0.00</i>	<i>p = 0.28</i>	<i>p < 0.00</i>
15–29	3,959 (40.4)	2,379 (63.6)	441 (11.6)	140 (3.5)	3,860 (98.3)	264 (6.7)
30–44	3,499 (35.7)	2,188 (66.6)	570 (17)	209 (6.0)	3,388 (98)	378 (11.4)
45–59	1,690 (17.2)	1,065 (69.0)	327 (20.3)	133 (8.0)	1,640 (98.2)	238 (14.4)
60–69	652 (6.7)	380 (70.2)	103 (16.6)	51 (8.0)	636 (99.1)	76 (11.8)
<i>Marital status (N = 9,799)</i>		<i>p < 0.00</i>	<i>p < 0.00</i>	<i>p = 0.00</i>	<i>p = 0.09</i>	<i>p < 0.00</i>
Single	1,705 (17.4)	966 (60.7)	198 (12.3)	69 (4.0)	1671 (98.8)	126 (7.6)
Married	6,593 (67.3)	4,143 (67.0)	1,053 (16.5)	400 (6.1)	6,404 (98.1)	616 (10.0)
Postgraduate completed (n = 12); *common-law (Separated = 386, Divorced = 402, widowed = 669, cohabitating = 41, Refused = 3).						
^ SBP >= 140/DBP >= 90; diabetes (Yes: FBG >= 110)						
£fasting blood glucose						
SBP: systolic blood pressure; DBP: diastolic blood pressure						

Unhealthy lifestyle factors						
common-law*	1,501 (15.3)	903 (67.8)	190 (13.3)	64 (4.3)	1,449 (98.4)	196 (13.5)
<i>Highest level of education</i> (N = 9,800)		<i>p</i> < 0.00	<i>p</i> = 0.07	<i>p</i> = 0.65	<i>p</i> = 0.00	<i>p</i> < 0.00
No formal Schooling	7,661 (78.2)	4,808 (67.0)	1,147 (15.5)	406 (5.3)	7,641 (98.5)	604 (8.3)
Primary school completed	975 (10.0)	579 (65.0)	124 (13.6)	59 (6.1)	941 (97.3)	104 (11.3)
Secondary school completed	653 (6.7)	372 (63.0)	82 (13.6)	40 (6.1)	631 (97.8)	120 (19.0)
College/University completed*	511 (5.2)	253 (55.0)	88 (18.3)	28 (5.5)	491 (97.0)	110 (22.8)
<i>Annual income</i> (N = 6,636)		<i>p</i> < 0.00	<i>p</i> < 0.00	<i>p</i> = 0.65	<i>p</i> = 0.00	<i>p</i> < 0.00
<=12,000 Birr	4,494 (67.7)	2,978 (71.2)	525 (12.1)	232 (5.2)	4,320 (97.4)	399 (9.4)
12,000 to 23, 299	1,017 (15.3)	634 (65.6)	214 (21.8)	48 (4.7)	1,003 (99.2)	112 (11.5)
23,300 +	1,125 (17.0)	661 (64.7)	184 (17.3)	63 (5.6)	1,084 (97.2)	213 (20.1)
<i>Regions (N = 9,800)</i>		<i>p</i> < 0.00	<i>p</i> < 0.00	<i>p</i> < 0.00	-	-
Addis Ababa	815 (6.7)	464 (75.2)	105 (15.0)	28 (3.4)	771 (98.3)	259 (33.0)
Afar	384 (2.1)	284 (74.3)	3 (0.8)	36 (9.4)	383 (99.7)	20 (5.8)
Amhara	1,867 (10.6)	1,064 (59.5)	479 (26.8)	34 (1.8)	1,861 (99.9)	96 (5.3)

Postgraduate completed (n = 12); *common-law (Separated = 386, Divorced = 402, widowed = 669, cohabitating = 41, Refused = 3).

^ SBP >= 140/DBP >= 90; diabetes (Yes: FBG >= 110)

£fasting blood glucose

SBP: systolic blood pressure; DBP: diastolic blood pressure

Unhealthy lifestyle factors						
B. Gumuz	384 (2.0)	263 (71.1)	105 (28.1)	20 (5.2)	379 (99.2)	25 (6.9)
Dire Dawa	257 (1.6)	164 (73.7)	7 (2.7)	32 (12.5)	254 (99.2)	29 (12.3)
Gambela	295 (3.0)	103 (36.4)	75 (26)	65 (22)	290 (99.3)	27 (9.4)
Harari	214 (2.2)	84 (70)	0 (0)	35 (16.4)	198 (100)	25 (12.2)
Oromia	2,308 (23.5)	1,561 (70)	233 (10.5)	130 (5.6)	2,285 (99.3)	191 (8.7)
SNNPR	1,706 (17.4)	1,079 (66)	196 (11.8)	62 (3.6)	1,552 (92.7)	137 (8.6)
Somali	615 (6.3)	255 (47.1)	14 (2.3)	89 (14.5)	601 (98.4)	84 (14.6)
Tigray	955 (9.7)	691 (75.8)	224 (24.5)	2 (0.2)	950 (99.8)	45 (5.0)
<i>Diabetes (N = 8,790)</i>		<i>p = 0.75</i>	<i>p = 0.05</i>	<i>p = 0.048</i>	-	<i>p < 0.00</i>
Yes	244 (2.8)	138 (67.0)	24 (10.4)	20 (8.2)	235 (98.3)	62 (25.9)
<i>Hypertension (N = 9,675)</i>		<i>p = 0.91</i>	<i>p = 0.00</i>	<i>p = 0.75</i>	<i>p = 0.95</i>	<i>P < 0.00</i>
SBP > = 140 or DBP > = 90	1,871 (19.3)	1,115 (66.1)	315 (17.8)	99 (5.3)	1,818 (98.3)	383 (20.7)
Postgraduate completed (n = 12); *common-law (Separated = 386, Divorced = 402, widowed = 669, cohabitating = 41, Refused = 3).						
^ SBP > = 140/DBP > = 90; diabetes (Yes: FBG > = 110)						
£fasting blood glucose						
SBP: systolic blood pressure; DBP: diastolic blood pressure						

Co-occurrences of unhealthy lifestyles

Table 2 shows sociodemographic characteristics across unhealthy lifestyle scores. The median unhealthy lifestyle score was three, only three participants had five risk factors and one in six participants (16.7%) had three or more unhealthy lifestyle factors. There were significant differences in unhealthy lifestyle scores across sociodemographic categories. A higher unhealthy lifestyle score was common in

older age rural participants (Fig. 1). In most regional administration areas, participants had a least 2 unhealthy lifestyle factors (Fig. 2).

Table 2

The numbers of unhealthy lifestyles and socio-demographic characteristics of the study participants in Ethiopia (N = 9,796).

		Number of risk factors				
		None	One	Two	Three	Four
Variables	n (%)	69 (0.8)	2,806 (32.0)	5274 (55.0)	1,501 (12.0)	147 (0.7)
<i>Residence (N = 9,797)</i>						
Rural	7,111(72.7)	44 (0.6)	2,019 (3)	3,801 (55.1)	953 (13.8)	85 (1.2)
<i>Sex (N = 9,797)</i>						
Female	5,821 (59.4)	49 (0.8)	1,788 (30.7)	3,273 (56.2)	659 (11.3)	52 (0.9)
<i>Age groups in year (N = 9,797)</i>						
15–29 years	3,959 (40.4)	24 (0.6)	1,272 (32.1)	2,30 (564)	392 (9.9)	39 (1.0)
30–44 years	3,499 (35.7)	24 (0.7)	940 (26.9)	1,865 (53.3)	614 (17.6)	55 (1.6)
45–59 years	1,690 (17.2)	14 (0.8)	413 (24.4)	846 (50.1)	370 (21.9)	47 (2.8)
60–69 years	652 (6.7)	7 (1.1)	181 (27.8)	333 (51.1)	125 (19.2)	6 (0.9)
<i>Marital status (N = 9,799)</i>						
Single	1,705 (17.4)	9 (0.5)	573 (33.6)	935 (54.8)	165 (9.7)	23 (1.3)
Married	6,593 (67.3)	42 (0.6)	1,809 (27.4)	3,523 (55.0)	1,108 (16.8)	109 (1.7)
common-law*	1,501 (15.3)	18 (1.2)	424(28.2)	816 (56.1)	228 (15.2)	15 (1.0)
<i>Highest level of education (N = 9,797)</i>						
No formal Schooling	7,661 (78.2)	52 (0.7)	2,156 (30.1)	4,186 (28.1)	1163 (15.2)	102 (1.3)
Primary school completed	975 (10.0)	9 (0.9)	294 (32.3)	516 (30.2)	140 (14.4)	15 (1.5)
secondary school completed	653 (6.7)	5 (0.8)	190 (32.2)	334 (29.1)	109 (16.7)	15 (2.3)

Number of risk factors						
College/University completed*	511 (5.2)	3 (0.6)	166 (40.7)	238 (32.5)	89 (17.4)	615 (2.9)
<i>Annual income (Birr) (N = 6,636)</i>						
<=12,000 Birr	4,494 (67.7)	40 (0.9)	1,234 (27.5)	2,499 (55.6)	662 (14.7)	59 (1.3)
12,000 to 23, 299 Birr	1,017 (15.3)	2 (0.2)	251 (24.7)	552 (54.3)	192 (18.9)	20 (2.0)
23, 300 + Birr	1,125 (17.0)	10 (0.9)	324 (28.8)	531 (47.2)	224 (19.9)	36 (3.2)
<i>Region</i>						
Addis Ababa	814 (8.3)	20 (2.5)	202 (24.8)	381 (46.8)	182 (22.4)	29 (3.6)
Afar	384 (4)	0 (0.0)	84 (21.9)	259 (67.4)	40 (10.4)	1 (0.3)
Amhara	1,866 (19)	1 (0.1)	552 (29.6)	967 (51.8)	337 (18.1)	9 (0.5)
B. Gumuz	383 (4)	1 (0.3)	81 (21.1)	206 (53.8)	81 (21.1)	14 (3.7)
Dire Dawa	257 (2.6)	0 (0.0)	78 (30.4)	132 (51.4)	43 (16.7)	4 (1.6)
Gambela	295 (3)	5 (1.7)	111 (37.6)	108 (36.6)	51 (17.3)	20 (6.8)
Harari	214 (2.2)	7 (3.3)	95 (44.4)	91 (42.5)	20 (9.3)	1 (0.5)
Oromia	2,308 (23.6)	7 (0.3)	599 (26.0)	1,341 (58.1)	325 (14.1)	36 (1.6)
SNNPR	1,706 (17.4)	25 (1.5)	561 (32.9)	919 (53.9)	178 (10.4)	23 (1.3)
Somali	615 (6.3)	2 (0.3)	266 (43.3)	269 (43.7)	73 (11.9)	5 (0.8)
Tigray	955 (9.7)	1 (0.1)	177 (18.5)	601 (62.9)	171 (17.9)	5 (0.5)
<i>Diabetes (N = 8,788)</i>						
Yes	243 (2.8)	0 (0.0)	59 (24.3)	139 (57.2)	38 (15.6)	7 (2.9)
<i>Hypertension (N = 9,675)</i>						

	Number of risk factors					
SBP > = 140 or DBP > = 90	1,871 (19.3)	15 (0.8)	472 (25.2)	946 (50.6)	387 (20.7)	51 (2.7)

Factors associated with unhealthy lifestyles

Participants who are male (AOR = 2.27, 95% CI: 1.95, 2.63), urban residence (AOR = 1.76, 95%CI = 1.50, 2.06), older age groups (30–44 y : AOR = 1.66, 95% CI = 1.38, 1.99; 45–59 y: AOR = 1.99, 95%CI = 1.60, 2.47) and 60–69 y (AOR = 1.59, 95%CI = 1.18 2.15)); married (AOR = 1.32, 95%CI = 1.04, 1.68) and earning annual income of more than 12,000 Ethiopian Birr (12,000 to 23, 299: AOR = 1.46, 95%CI = 1.20, 176 and 23,300 and above: AOR = 1.41, 95%CI = 1.12, 1.75) and those with high blood pressure (AOR = 1.53, 95%CI = 1.30, 1.80) had higher odds of unhealthy lifestyle. Participants with higher educational status (AOR = 0.33, 95%CI = 0.55, 0.97) had lower odds of having unhealthy lifestyles (Table 3).

Table 3
Sociodemographic factors associated with unhealthy lifestyle

Variables	At least two unhealthy lifestyle risk factors	Three or more unhealthy lifestyle risk factors	COR (95%CI)	AOR (95%CI)
	8533 (87.0%)	1264 (13.0%)		
Residence				
Rural	5,864 (85.0)	925 (15.0)	1	1
Urban	2,285 (79.0)	338 (21.0)	1.51 (1.35, 1.68) ***	1.76 (1.50, 2.06) ***
Sex				
Female	5,110 (87.8)	711 (12.2)	1	
Male	3,039 (76.4)	937 (23.6)	2.22 (1.99, 2.47) ***	2.27 (1.95, 2.63) ***
Age (years)				
15–29	3,526 (89.1)	431 (10.9)	1	1
30–44	2,829 (80.9)	669 (19.1)	1.93 (1.70, 9.89) ***	1.66 (1.38, 1.99) ***
45–59	1,273 (75.3)	417 (27.7)	2.2.68 (2.31, 12.96) ***	1.99 (1.60, 2.47) ***
60–69	521 (79.9)	131 (20.1)	2.06 (1.66, 6.54) ***	1.59 (1.18, 2.15) **
Marital status				
Single	1, 517 (89.0)	188 (11.0)	1	1
Married	5,374 (81.5)	1,217 (18.5)	1.83 (1.55, 2.16) ***	1.32 (1.04, 1.68) *
common-law	1,258 (83.8)	243 (16.2)	1.56 (1.27, 1.91) ***	1.29 (0.94, 1.76)
Highest level of education				

COR = Crude odds ratios; AOR = Adjusted odds ratios

Variables	At least two unhealthy lifestyle risk factors	Three or more unhealthy lifestyle risk factors	COR (95%CI)	AOR (95%CI)
	8533 (87.0%)	1264 (13.0%)		
No formal Schooling	6,394 (83.5)	1,265 (16.5)	1	1
Primary school completed	819 (84.1)	155 (15.9)	0.96 (0.80, 1.14)	0.98 (0.77, 1.25)
secondary school completed	529 (81.0)	124 (19.0)	1.18 (0.96, 1.45)	0.95 (0.72, 1.24)
College/University completed*	407 (79.6)	104 (20.4)	1.29 (1.03, 1.61) *	0.73 (0.55, 0.97) *
Annual income (Birr)				
<=12,000	3,773 (84.0)	721 (16.0)	1	1
12,000 to 23, 299	805 (79.2)	212 (20.8)	1.38 (1.16, 1.63) ***	1.46 (1.20, 1.76) ***
23, 300 +	865 (76.9)	260 (23.1)	1.57 (1.34, 1.84) ***	1.48 (1.22, 1.79) ***
Diabetes				
No	7,122 (83.3)	1,423 (16.7)	1	1
Yes	198 (81.5)	45 (18.5)	1.14 (0.81, 1.56)	0.70 (0.46, 1.04)
High blood pressure				
No	6,605 (84.6)	1,199 (15.4)	1	1
Yes	1,433 (76.6)	438 (23.4)	1.68 (1.49, 1.90) ***	1.53 (1.30, 1.80) ***
COR = Crude odds ratios; AOR = Adjusted odds ratios				

Unhealthy lifestyle factors, diabetes, and hypertension

Table 4 shows that excessive alcohol intake and overweight/obesity are associated with diabetes and high blood pressure.

Table 4

Prevalence (%) and relationships of unhealthy lifestyle factors with diabetes and hypertension in Ethiopia

Unhealthy lifestyle factors	Diabetes		High blood pressure	
	No	Yes	No	Yes
Smoking	$\chi^2 = 4.48, df = 1, p = 0.034$		$\chi^2 = 0.14, df = 1, p = 0.71$	
No	8, 130 (92.2)	223 (2.5)	7,373 (76.2)	1,772 (18.3)
Yes	441 (5.0)	20 (0.2)	430 (4.4)	99 (1.0)
Excessive alcohol intake	$\chi^2 = 4.25, df = 1, p = 0.04$		$\chi^2 = 10.3, df = 1, p = 0.001$	
No	6,955 (82.4)	207 (2.5)	6,409 (69.01)	1,454 (15.6)
Yes	1,259 (15.0)	24 (0.28)	1,109 (11.9)	315 (3.4)
Insufficient physical activity	$\chi^2 = 0.151, df = 1, p = 0.69$		$\chi^2 = 0.02, df = 1, p = 0.88$	
No	2,742 (33.5)	68 (0.8)	2,494 (27.7)	572 (6.4)
Yes	5,250 (64.0)	138 (1.7)	4,821 (53.6)	1,115 (12.4)
Low fruit and vegetable intake	$\chi^2 = 0.024, df = 1, p = 0.88$		$\chi^2 = 0.004, df = 1, p = 0.9$	
No	153 (1.8)	4 (0.05)	132 (1.4)	32 (0.3)
Yes	8,308 (95.5)	235	7,594 (79.3)	1,818 (19.0)
Overweight or obesity	$\chi^2 = 68.24, df = 1, p = <0.00$		$\chi^2 = 286.78, df = 1, p = <0.00$	
No	7,431 (87.8)	177 (2.09)	6879 (74.1)	1,464 (15.8)
Yes	791 (9.3)	62 (0.73)	555 (5.98)	383 (4.1)

Discussion

In this study, we examined the socio-demographic correlates of unhealthy lifestyle factors in Ethiopia, with a focus on smoking, excessive alcohol intake, physical inactivity, low daily fruit and vegetable consumption, and overweight and obesity. A high prevalence of unhealthy lifestyle factors was reported, with 16.7% having three or more unhealthy lifestyle factors. Unhealthy lifestyles were significantly associated with gender, marital status urban residence, old age, and higher income

Several large, nationally representative surveys such as the Global Burden of Disease study identified that a significant proportion of NCDs and disability-adjusted life years lost across the globe – including in LMICs – are due to mainly modifiable lifestyle factors such as smoking, unhealthy diet, physical inactivity, and inappropriate alcohol consumption (30). In the current study, we found that participants were more likely to engage in two or more unhealthy behaviours. Previous studies (8, 31, 32) reported

similar findings. High prevalence and co-occurrence of unhealthy lifestyle factors are in turn associated with high burden of morbidity and premature mortality from chronic illnesses, including cardiovascular diseases, diabetes, chronic obstructive pulmonary disease, and some types of cancer (33). This may eventually lead to healthcare system strain and increased cost of disease management, and productivity loss due to illnesses.

Our findings revealed that a high prevalence of co-occurrence of unhealthy lifestyle factors was significantly associated with place of residence, where participants from urban areas were more likely to have unhealthy lifestyles than their counterparts. This may be because people in urban areas in developing countries, including Ethiopia, are increasingly exposed to unhealthy environments, thence behaviours, compared to rural areas due to economic and social developments. In line with, a relatively sedentary lifestyle, other lifestyle factors, such as smoking, alcohol consumption and overweight and obesity are more rampant (34–37)

Similarly, the current study showed that the likelihood of co-occurrence of risk factors or unhealthy lifestyle increases among participants with higher income, which is in line with previous studies from Ethiopia, Ghana, and Chile. Risk factors, such as overweight and obesity, and low physical activity were associated with wealthier socioeconomic groups (33–35). This is a common occurrence in developing countries' contexts, where people tend to consume energy-dense and high-fat foods and follow a sedentary lifestyle as their economic condition improves (34, 38). However, the study showed participants with higher educational status are more prone to engage in physical activity and have a good diet. This finding is similar to a study done in Ghana that; Ghanaian adults were more likely to live a healthier lifestyle with increasing levels of educational attainment (34). This may be because educated people could easily access educational messages on health and risk factors to choose their unhealthy behaviour.

The study also showed variations in the co-existence of unhealthy lifestyle risk factors by socio-demographic factors such as gender, age, and marital status. It was observed that despite mixed findings on gender and the number of unhealthy lifestyles, obesity and insufficient physical activity, were higher among females than males, while males had higher risks for excessive alcohol intake and smoking (35, 39). Likewise, our study showed that older participants were more likely to have an unhealthy lifestyle than younger groups. The current finding is in line with other similar studies that the prevalence of unhealthy lifestyles, such as smoking, excessive alcohol drinking, and obesity, increased with age (38, 39). In the study, those who were married also showed a significant association with higher odds of an unhealthy lifestyle. In Ethiopia or other developing countries, evidence indicates that married people are more likely to adopt a sedentary lifestyle (38, 40, 41).

Overall, the study shows that the co-occurrence of unhealthy lifestyle factors is alarmingly high. Individual-level risk factors such as excessive alcohol intake and overweight and obesity were found to be associated with diabetes and high blood pressure. There is a need to emphasize providing continuous and focused health promotion and behavioural support to adopt healthy lifestyle habits.

Implication for policy and practice

Consistent with the rapid socio-economic development and lifestyle changes Ethiopia has seen over the last few decades, there has been a stark epidemiological transition from one that is predominantly communicable disease towards the double burden of communicable and non-communicable diseases. While several studies in Ethiopia have documented the prevalence of unhealthy lifestyle behaviours individually, our study is the first to document the co-occurrence of these risk factors according to sociodemographic characteristics. Findings from this study can be used by policymakers as an input to implement comprehensive, policy-level behavioural and public health interventions that will ultimately reduce the burden of NCDs in Ethiopia through a healthy lifestyle program.

Furthermore, understanding the increasing risk of NCDs due to the co-occurrence of multiple risk factors will also help to design comprehensive and coordinated interventions that will reduce the burden on the already overstretched healthcare system. Our findings also call for designing context-specific and tailored interventions in addressing the risk factors for NCDs. Risk factors, such as age, sex, and others must be taken into consideration when designing healthy lifestyle programs.

This study has both strengths and limitations. The main strengths are that: (1) it is the first study that assesses the co-occurrence NCD risk factors, and (2) the study was performed nationally with relatively large sample size. The limitations are: (1) most of the study participants are from rural areas, (2) we used the 2015 survey, and the data may not reflect the current unhealthy lifestyle factors.

Conclusion

The present study showed one in eight participants had three or more unhealthy lifestyle factors and the distributions were significantly different by sociodemographic characteristics. Participants with higher educational status had lower odds of an unhealthy lifestyle.

Declarations

Data availability statement

The study data are available upon request from the corresponding author through yalassefa@gmail.com.

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Authors contribution

YAG, DNK, KAA, KYA, and YAM contributed to conceiving the research idea and design. YAG design and conduct the analysis. DNK is involved in data cleaning. YAG, YAM, DAE, HGT, and ATG drafted the manuscript. DNK, KAA, YA, and BMZ reviewed and provided extensive feedback on the manuscript. All authors critically reviewed, edited, and approved the final manuscript for submission.

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Figures

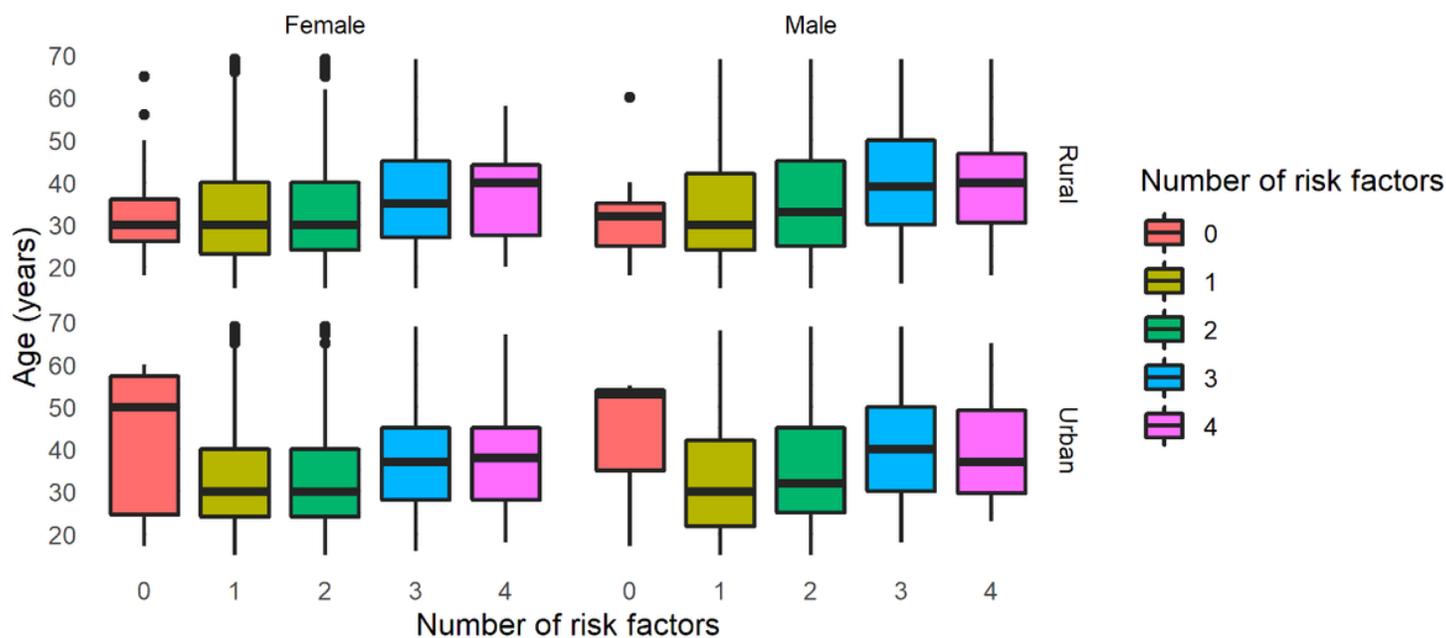


Figure 1

Distributions of unhealthy lifestyle scores across age by sex and residence of the study participants in Ethiopia

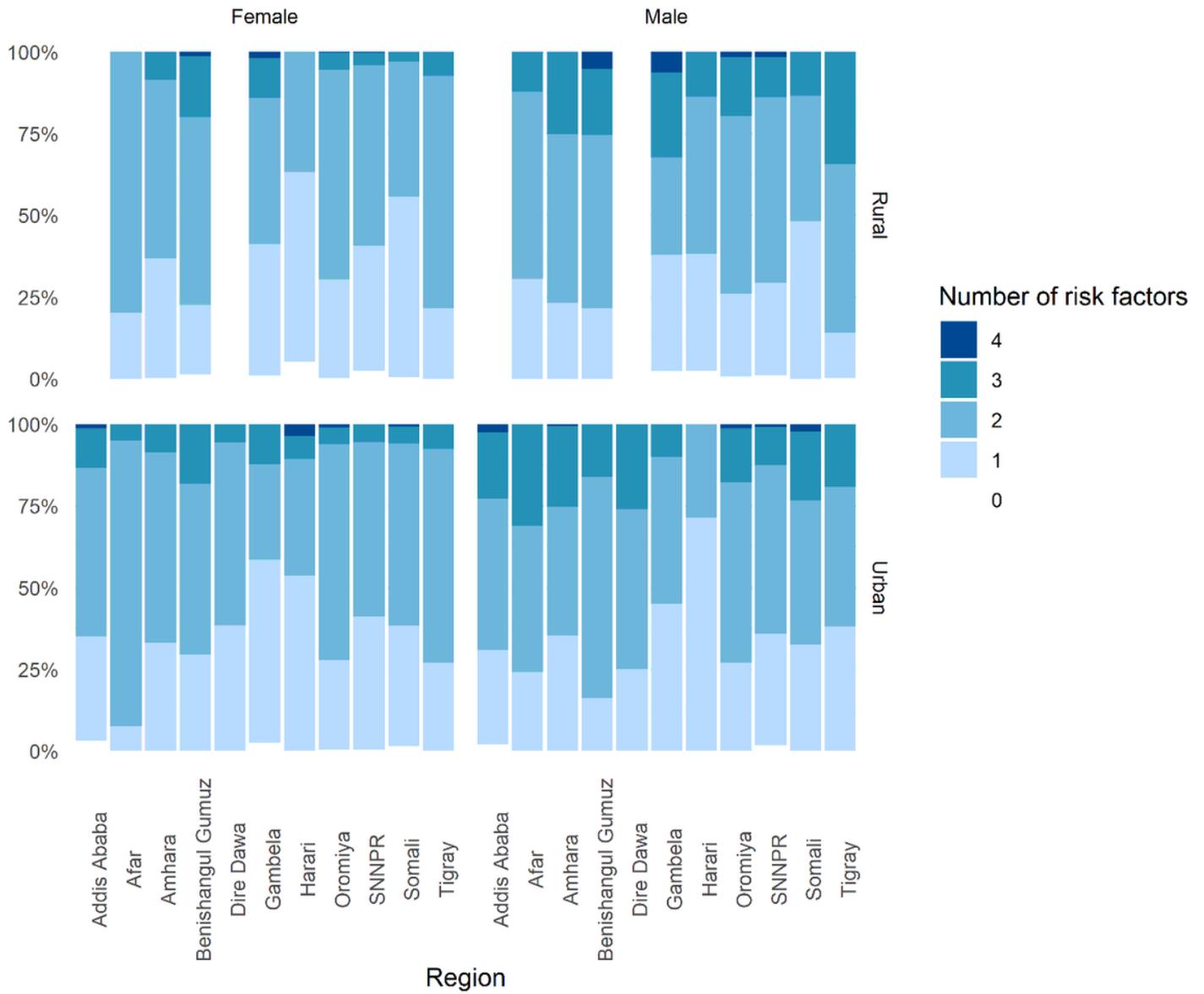


Figure 2

Distributions of unhealthy lifestyle scores of participants in each region by sex and residence of the study participants in Ethiopia