

ORIGINAL ARTICLE

Exploring Sociodemographic determinants of obesity in Malawian women of reproductive age: insights from a nationwide survey

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ABSTRACT

Background: Malnutrition is a major public health concern in sub-Saharan Africa, yet recent data on its prevalence and determinants among women in Malawi are lacking. Identification of the risk factors of malnutrition is essential for developing targeted interventions to reduce its burden.

Objective: To identify determinants of underweight, overweight, and obesity among Malawian women.

Methodology: We performed a cross-sectional study of women aged 15–49 years using data from the 2024 Malawi Demographic and Health Survey. We performed the analysis with SPSS version 24. Multinomial logistic regression was conducted to identify determinants of body mass index categories, using normal weight as the reference group. The results were reported using adjusted odds ratios (AORs) and their corresponding 95% confidence intervals (CIs).

Results: We found that 64.1% of women had a normal weight. Meanwhile, 16.7% were overweight, 13.2% were obese, and 5.8% were underweight. On performing the regression, we found that older age (45–49 years) and higher wealth quintiles were associated with higher odds of being overweight and obese ($p < 0.001$), while non-internet use in the previous month was associated with lower odds of being overweight (AOR: 0.618; 95% CI: 0.493–0.775) or obese (AOR: 0.604; 95% CI: 0.477–0.764); compared to daily users ($p < 0.001$). Urban residence was significantly associated with obesity (AOR: 1.757; 95% CI: 1.409–2.193), while not currently working increased the odds of being underweight (AOR: 1.392; 95% CI: 1.153–1.681) and overweight (AOR: 1.183; 95% CI: 1.029–1.360) ($p < 0.001$). Education, religion, and ethnicity showed non-significant associations.

Conclusion: This study revealed a dual burden of undernutrition and obesity among Malawian women, with around one-third of women being overweight or obese. Obesity was associated with living in urban areas, being wealthier, and being older. Meanwhile, being underweight was associated with lower wealth and unemployment. These findings highlight the need for interventions to reduce the burden of malnutrition in Malawi.

Keywords: Obesity, overweight, underweight, Malawi, Malnutrition, women's health, DHS, sub-Saharan Africa

Introduction

Overweight and obesity are major global public health concerns [1]. They affect more than one billion people globally and contribute to the burden of non-communicable diseases (NCDs). These include cardiovascular disease, type 2 diabetes, hypertension, and cancer [1]. NCDs resulted in more than 43 million deaths worldwide in 2021. Around 82% of them occurred in low- and middle-income countries, and 42% of them

occurred among people younger than 70 years [2]. It is estimated that NCDs will account for 69% of deaths by 2030 [3].

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While obesity was previously a concern of high-income countries, its prevalence has increased across low- and middle-income countries [1]. This is particularly relevant in sub-Saharan Africa, where urbanization and economic development resulted in lifestyle and dietary changes [4]. At the same time, many African countries experience undernutrition. Thus, resulting in a double burden of malnutrition in which both underweight and obesity are prevalent within the same population [4]. Women of reproductive age are especially vulnerable to this dual challenge. Underweight increases the risk of small for gestational age newborns [5]. Meanwhile, being overweight or obese is associated with neonatal asphyxia, preterm birth, and post-partum hemorrhage [5,6].

Obesity rates have significantly increased by twofold between 1999 and 2014 across several sub-Saharan African countries, including Malawi [7]. Given the adverse health impacts associated with malnutrition, the United Nations aimed to reduce malnutrition by 2025 and eliminate it by 2030 [8]. Achieving these goals would significantly reduce mortality due to NCDs [9]. However, it is estimated that the burden of overweight and obesity will increase by 2030, and none of the sub-Saharan African countries will be able to achieve these goals [10]. Thus, it is essential to determine the current prevalence of malnutrition and its associated risk factors.

Previous studies conducted in sub-Saharan Africa identified several factors associated with obesity among women of reproductive age [11,12]. These include age, socioeconomic status, and place of residence. However, the available evidence from Malawi is based on older studies. Furthermore, some of them included only specific populations such as non-pregnant women or children [11,13,14]. The 2024 Malawi Demographic and Health Survey (DHS) provides nationally representative data on women of reproductive age. To date, there is limited recent evidence on the current burden of under- and overnutrition and their risk factors among Malawian women. Also, given the ongoing demographic and nutritional habits changes in Malawi, previously identified risk factors might not explain the patterns of BMI. Thus, updated evidence is needed to identify malnutrition prevalence and risk factors to support national efforts, aligning with the global targets of the United Nations of eradicating malnutrition by 2030 [8].

This study aimed to investigate the prevalence of underweight, overweight, and obesity and their risk factors among women aged 15–49 years using nationally representative data from the 2024 Malawi DHS database.

Methods

Data source

This study utilized data from the 2024 Malawi Demographic and Health Survey, a nationally representative survey of women aged 15–49 years

[15]. The survey employed a stratified two-stage cluster sampling design based on the sampling frame derived from the 2018 Malawi Population and Housing Census conducted by the National Statistical Office. The sampling strategy was designed to generate representative estimates at the national level, across urban and rural areas, and within 33 survey domains, including 28 districts, four major cities (Mzuzu, Lilongwe, Zomba, and Blantyre), and Dzaleka refugee camp [15].

In the first stage, clusters were selected using probability proportional to size sampling. In the second stage, households within selected clusters were identified through household listing and systematically sampled. This design enabled the generation of representative estimates for key demographic and health indicators across the country and its administrative regions [15].

Inclusion and exclusion criteria

The study included women aged 15–49 years with complete body mass index (BMI) data. BMI was measured in accordance with the Centers for Disease Control and Prevention guidelines [16]. Women with missing BMI information were excluded from the analysis.

Included variables

The study included a range of socio-demographic, behavioral, and socioeconomic variables. Sociodemographic characteristics comprised age (5-year groups), place of residence (urban or rural), region, educational level, religion, and ethnicity. Behavioral factors included frequency of media exposure, such as reading newspapers or magazines, listening to radio, watching television, and internet use, as well as smoking status. Socioeconomic status was assessed using the household wealth index, which was categorized into five groups (poorest, poorer, middle, richer, and richest) based on the DHS wealth index methodology that classifies households using asset-based information [17]. Additional variables included current working status and marital status.

Statistical analysis

Data analysis was performed using SPSS version 24. Sampling weights were applied following DHS recommendations to account for the complex survey design [18]. The DHS weight variable, comprising eight digits with six decimal places, was rescaled by dividing by 1,000,000 prior to analysis. Descriptive statistics were used to summarize participant characteristics and were reported as frequencies and percentages. Associations between BMI categories and independent variables were examined using the chi-square test. Variables that were significant at the bivariate level were included in the multivariable model. Multinomial logistic regression was conducted to identify determinants of BMI categories, using normal weight as the reference group. Results were expressed as adjusted odds ratios (AORs) with 95% confidence intervals (CIs), and statistical significance was set at $p < 0.05$.



Exploring sociodemographic determinants of obesity

Results

Data were collected from 10,590 Malawian women aged 15–49 years. The majority (64.1%) were of normal weight, while 13.2% were obese, 16.7% were overweight, and 5.8% were underweight. The highest proportion of obese participants was observed in urban areas (27.3%), and obesity prevalence increased with higher wealth, with the richest quintile accounting for 25.6% of obese women compared to only 7.7% among the poorest. Regarding education, women with higher education had the greatest burden of overweight and obesity combined

(26.4% and 37.0%, respectively), whereas underweight was most common among those with no education (6.9%). The 15–19 age group had the highest proportion of normal weight women (72.8%), while older groups showed progressively higher rates of overweight and obesity. The full distribution of baseline characteristics across BMI categories is presented in [Table 1](#).

In multivariable multinomial logistic regression ([Table 2](#)), using normal weight as the reference category, the following factors were significantly associated with BMI category:

Table 1. Baseline characteristics of the participants.

Variables		BMI category				p-value
		Underweight N (%)	Normal weight N (%)	Overweight N (%)	Obese N (%)	
Age in 5-year groups						<0.001
	15–19	215 (9.7%)	1622 (72.8%)	151 (6.8%)	240 (10.8%)	
	20–24	134 (6.2%)	1513 (70.1%)	286 (13.3%)	225 (10.4%)	
	25–29	64 (3.9%)	1059 (64.6%)	314 (19.2%)	202 (12.3%)	
	30–34	55 (3.9%)	838 (59.3%)	330 (23.3%)	189 (13.4%)	
	35–39	44 (3.6%)	708 (57.7%)	272 (22.2%)	203 (16.6%)	
	40–44	52 (4.8%)	598 (54.7%)	249 (22.8%)	194 (17.7%)	
	45–49	50 (6.0%)	454 (54.6%)	183 (22.0%)	144 (17.3%)	
Type of place of residence						<0.001
	Urban	77 (4.2%)	861 (46.7%)	401 (21.8%)	503 (27.3%)	
	Rural	538 (6.1%)	5930 (67.8%)	1383 (15.8%)	894 (10.2%)	
Region group						<0.001
	Northern	72 (5.1%)	902 (63.9%)	252 (17.9%)	186 (13.2%)	
	Central	204 (4.6%)	2778 (62.8%)	816 (18.5%)	625 (14.1%)	
	Southern	338 (7.1%)	3111 (65.5%)	715 (15.1%)	586 (12.3%)	
Highest educational level						<0.001
	No education	51 (6.9%)	472 (64.0%)	121 (16.4%)	93 (12.6%)	
	Primary	411 (6.0%)	4653 (67.3%)	1078 (15.6%)	767 (11.1%)	
	Secondary	146 (5.5%)	1569 (59.1%)	510 (19.2%)	432 (16.3%)	
	Higher	6 (2.2%)	98 (34.4%)	75 (26.4%)	105 (37.0%)	
Religion						<0.001
	Catholic	68 (4.4%)	1003 (63.9%)	268 (17.1%)	231 (14.7%)	
	CCAP	59 (3.9%)	886 (59.0%)	305 (20.3%)	252 (16.8%)	
	Anglican	14 (6.7%)	135 (64.3%)	27 (12.7%)	34 (16.2%)	
	Seven days/Baptist	47 (5.4%)	562 (64.0%)	137 (15.5%)	133 (15.1%)	
	Pentecostal	72 (5.9%)	789 (64.4%)	223 (18.2%)	140 (11.4%)	
	Other christian	221 (6.1%)	2367 (65.7%)	585 (16.2%)	428 (11.9%)	
	Muslim	131 (8.5%)	1003 (65.4%)	230 (15.0%)	170 (11.1%)	
	No religion	2 (3.0%)	45 (72.4%)	9 (15.3%)	6 (9.3%)	
Ethnicity						<0.001
	Chewa	189(5.2%)	2387(66.2%)	606(16.8%)	422(11.7%)	
	Tumbuka	47(4.4%)	650(61.4%)	205(19.4%)	156(14.8%)	
	Lomwe	136 (6.4%)	1321 (61.8%)	370 (17.3%)	310 (14.5%)	
	Tonga	12 (6.5%)	109 (58.3%)	31 (16.4%)	35 (18.8%)	
	Yao	115 (8.0%)	938(65.8%)	193 (13.5%)	180 (12.6%)	



Exploring sociodemographic determinants of obesity

Variables		BMI category				p-value
		Underweight	Normal weight	Overweight	Obese	
		N (%)	N (%)	N (%)	N (%)	
	Sena	33 (9.2%)	257 (71.3%)	35 (9.8%)	35 (9.6%)	
	Nkhonde	7 (6.1%)	78 (64.5%)	20 (16.4%)	16 (13.0%)	
	Ngoni	46 (4.2%)	653 (60.0%)	217 (19.9%)	173 (15.9%)	
	Mang'anja	23 (5.7%)	265 (66.3%)	72 (18.0%)	40 (10.0%)	
	Lambia	1 (2.6%)	31 (58.0%)	13 (24.9%)	8 (14.5%)	
	Ndali	2 (3.7%)	47 (72.7%)	9 (13.4%)	7 (10.2%)	
	Other malawian	3 (5.2%)	35 (61.4%)	11 (18.6%)	9 (14.7%)	
	Other countries ethnicity	—	10 (52.4%)	2 (10.7%)	7 (36.9%)	
	Don't know	—	8 (97.4%)	—	0 (2.6%)	
Frequency of reading newspapers or magazine						0.424
	Not at all	522 (5.9%)	5681 (64.3%)	1477 (16.7%)	1152 (13.0%)	
	Less than once a week	61 (5.9%)	679 (64.9%)	171 (16.3%)	134 (12.8%)	
	At least once a week	31 (4.4%)	431 (60.9%)	136 (19.2%)	110 (15.6%)	
Frequency of listening to radio						<0.001
	Not at all	396 (6.2%)	4198 (65.9%)	1005 (15.8%)	774 (12.1%)	
	Less than once a week	88 (5.3%)	1063 (63.9%)	276 (16.6%)	236 (14.2%)	
	At least once a week	131 (5.1%)	1530 (60.0%)	502 (19.7%)	387 (15.2%)	
Frequency of watching television						<0.001
	Not at all	513 (6.0%)	5750 (66.7%)	1381 (16.0%)	973 (11.3%)	
	Less than once a week	38 (5.0%)	457 (60.2%)	129 (17.1%)	134 (17.7%)	
	At least once a week	64 (5.2%)	584 (48.2%)	273 (22.6%)	290 (24.0%)	
Frequency of using internet last month						<0.001
	Not at all	554 (6.0%)	6114 (66.8%)	1441 (15.7%)	1047 (11.4%)	
	Less than once a week	6 (6.2%)	68 (68.7%)	15 (15.5%)	10 (9.6%)	
	At least once a week	25 (7.4%)	195 (56.5%)	68 (19.5%)	58 (16.7%)	
	Almost every day	29 (3.0%)	413 (42.0%)	259 (26.3%)	282 (28.7%)	
Wealth index combined						<0.001
	Poorest	144 (6.8%)	1561 (74.0%)	242 (11.5%)	162 (7.7%)	
	Poorer	124 (6.3%)	1387 (70.3%)	284 (14.4%)	178 (9.0%)	
	Middle	141 (7.0%)	1365 (67.9%)	337 (16.8%)	166 (8.3%)	
	Richer	117 (5.8%)	1293 (63.7%)	360 (17.7%)	260 (12.8%)	
	Richest	88 (3.6%)	1185 (48.1%)	560 (22.7%)	631 (25.6%)	
Frequency of smoking cigarettes						0.150
	Does not smoke	610 (5.8%)	6755 (64.2%)	1768 (16.8%)	1386 (13.2%)	
	Every day	1 (11.8%)	9 (74.9%)	1 (4.7%)	1 (8.6%)	
	Some days	4 (6.4%)	27 (48.1%)	16 (27.6%)	10 (17.8%)	
Respondent currently working						<0.001
	No	360 (7.1%)	3286 (65.0%)	799 (15.8%)	607 (12.0%)	
	Yes	255 (4.6%)	3505 (63.3%)	985 (17.8%)	790 (14.3%)	
Current marital status						<0.001
	Never in union	221 (9.8%)	1556 (68.8%)	181 (8.0%)	305 (13.5%)	
	Married	242 (4.3%)	3528 (62.8%)	1114 (19.8%)	731 (13.0%)	
	Living with partner	32 (4.3%)	468 (62.0%)	159 (21.1%)	95 (12.6%)	
	Widowed	11 (4.1%)	150 (57.3%)	48 (18.3%)	53 (20.4%)	
	Divorced	58 (6.8%)	531 (62.0%)	136 (15.9%)	130 (15.2%)	
	No longer living together/ separated	51 (6.2%)	548 (66.5%)	145 (17.6%)	81 (9.8%)	
	Nullified	1 (4.6%)	12 (75.8%)	1 (9.0%)	2 (10.6%)	

Data are presented as N (%). N represents weighted population estimates (thousands). BMI categories follow WHO classification: Underweight <18.5, Normal weight 18.5–24.9, Overweight 25.0–29.9, Obese ≥30.0 kg/m². p-values from complex-samples Rao-Scott adjusted chi-square tests.



Exploring sociodemographic determinants of obesity

Table 2. Multinomial logistic regression of factors associated with BMI category among Malawian women aged 15–49 Years (reference category: normal weight).

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
Underweight	Age in 5-year groups						
	15–19	–0.329	0.250	0.720	0.441	1.176	0.189
	20–24	–0.417	0.226	0.659	0.423	1.028	0.066
	25–29	–0.659	0.258	0.517	0.312	0.858	0.011
	30–34	–0.549	0.260	0.577	0.347	0.962	0.035
	35–39	–0.601	0.235	0.548	0.345	0.871	0.011
	40–44	–0.290	0.261	0.748	0.448	1.249	0.266
	45–49	Reference		1.000			
	Type of place of residence						
	Urban	0.203	0.177	1.225	0.866	1.735	0.252
	Rural	Reference		1.000			
	Highest educational level						
	No education	0.155	0.538	1.168	0.406	3.359	0.773
	Primary	–0.034	0.491	0.967	0.369	2.535	0.945
	Secondary	0.073	0.476	1.076	0.423	2.740	0.878
	Higher	Reference		1.000			
	Region group						
	Northern	–0.061	0.307	0.941	0.515	1.717	0.842
	Central	–0.248	0.171	0.780	0.558	1.091	0.146
	Southern	Reference		1.000			
	Religion						
	Catholic	0.392	0.747	1.479	0.341	6.417	0.600
	CCAP	0.398	0.775	1.489	0.325	6.817	0.607
	Anglican	0.808	0.799	2.243	0.467	10.762	0.312
	Seven days/Baptist	0.592	0.772	1.807	0.397	8.226	0.444
	Pentecostal	0.678	0.766	1.970	0.438	8.861	0.376
	Other Christian	0.715	0.750	2.044	0.469	8.905	0.340
	Muslim	0.959	0.791	2.610	0.552	12.341	0.226
	No religion	Reference		1.000			
	Ethnicity						
	Chewa	0.079	0.507	1.082	0.400	2.927	0.876
	Tumbuka	–0.086	0.499	0.917	0.345	2.441	0.862
	Lomwe	0.111	0.505	1.118	0.414	3.015	0.826
	Tonga	0.250	0.569	1.285	0.420	3.928	0.660
	Yao	–0.009	0.528	0.991	0.351	2.795	0.986
	Sena	0.376	0.537	1.457	0.507	4.185	0.484
	Nkhonde	0.102	0.562	1.107	0.368	3.336	0.856



Exploring sociodemographic determinants of obesity

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
	Ngoni	-0.082	0.528	0.921	0.327	2.599	0.877
	Mang'anja	-0.048	0.541	0.953	0.330	2.755	0.929
	Lambia	-0.610	0.653	0.543	0.151	1.958	0.351
	Ndali	-0.461	0.657	0.631	0.174	2.289	0.483
	Other malawian	Reference		1.000			
	Frequency of listening to radio						
	Not at all	-0.016	0.148	0.984	0.736	1.315	0.911
	Less than once a week	-0.063	0.191	0.939	0.645	1.367	0.743
	At least once a week	Reference		1.000			
	Frequency of watching television						
	Not at all	-0.328	0.174	0.720	0.512	1.012	0.059
	Less than once a week	-0.373	0.227	0.688	0.441	1.074	0.100
	At least once a week	Reference		1.000			
	Frequency of using internet last month						
	Not at all	0.097	0.291	1.102	0.622	1.951	0.740
	Less than once a week	0.041	0.513	1.041	0.380	2.854	0.937
	At least once a week	0.466	0.368	1.594	0.774	3.282	0.205
	Almost every day	Reference		1.000			
	Wealth index combined						
	Poorest	0.548	0.235	1.730	1.091	2.743	0.020
	Poorer	0.495	0.218	1.640	1.070	2.516	0.023
	Middle	0.575	0.212	1.777	1.172	2.695	0.007
	Richer	0.401	0.201	1.493	1.006	2.215	0.046
	Richest	Reference		1.000			
	Respondent currently working						
	No	0.331	0.096	1.392	1.153	1.681	0.001
	Yes	Reference		1.000			
	Current marital status						
	Never in union	0.696	1.074	2.007	0.243	16.544	0.517
	Married	0.100	1.072	1.105	0.135	9.061	0.926
	Living with partner	0.028	1.100	1.028	0.119	8.909	0.980
	Widowed	0.004	1.132	1.004	0.109	9.270	0.997
	Divorced	0.521	1.084	1.683	0.200	14.135	0.631
	No longer living together/separated	0.422	1.084	1.525	0.182	12.805	0.697
	Nullified	Reference		1.000			
Overweight	Age in 5-year groups						



Exploring sociodemographic determinants of obesity

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
	15-19	-1.166	0.180	0.312	0.219	0.444	<0.001
	20-24	-0.755	0.147	0.470	0.352	0.628	<0.001
	25-29	-0.437	0.134	0.646	0.497	0.839	0.001
	30-34	-0.089	0.139	0.915	0.696	1.201	0.520
	35-39	-0.107	0.145	0.899	0.676	1.194	0.460
	40-44	0.022	0.147	1.022	0.766	1.365	0.880
	45-49	Reference		1.000			
	Type of place of residence						
	Urban	0.131	0.108	1.140	0.922	1.409	0.227
	Rural	Reference		1.000			
	Highest educational level						
	No education	-0.374	0.251	0.688	0.420	1.127	0.137
	Primary	-0.273	0.213	0.761	0.501	1.156	0.200
	Secondary	-0.181	0.202	0.834	0.561	1.240	0.369
	Higher	Reference		1.000			
	Region Group						
	Northern	0.159	0.162	1.173	0.853	1.611	0.326
	Central	0.349	0.111	1.418	1.140	1.763	0.002
	Southern	Reference		1.000			
	Religion						
	Catholic	0.277	0.470	1.319	0.524	3.321	0.556
	CCAP	0.360	0.482	1.434	0.557	3.691	0.455
	Anglican	-0.090	0.514	0.914	0.333	2.509	0.861
	Seven days/Baptist	0.114	0.478	1.120	0.439	2.862	0.812
	Pentecostal	0.355	0.458	1.426	0.581	3.503	0.438
	Other Christian	0.279	0.451	1.322	0.546	3.200	0.536
	Muslim	0.491	0.472	1.634	0.647	4.126	0.298
	No religion	Reference		1.000			
	Ethnicity						
	Chewa	-0.173	0.281	0.841	0.485	1.461	0.539
	Tumbuka	-0.027	0.275	0.973	0.567	1.671	0.922
	Lomwe	0.101	0.280	1.107	0.638	1.918	0.718
	Tonga	-0.190	0.309	0.827	0.451	1.516	0.539
	Yao	-0.292	0.301	0.747	0.413	1.349	0.333
	Sena	-0.633	0.329	0.531	0.278	1.014	0.055
	Nkhonde	-0.348	0.389	0.706	0.329	1.515	0.371
	Ngoni	0.080	0.284	1.084	0.620	1.894	0.777
	Mang'anja	0.064	0.302	1.066	0.589	1.926	0.833
	Lambia	0.295	0.345	1.344	0.683	2.645	0.392



Exploring sociodemographic determinants of obesity

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
	Ndali	-0.502	0.358	0.605	0.300	1.223	0.162
	Other Malawian	Reference		1.000			
	Frequency of listening to radio						
	Not at all	0.023	0.089	1.023	0.859	1.219	0.796
	Less than once a week	-0.048	0.106	0.953	0.773	1.175	0.652
	At least once a week	Reference		1.000			
	Frequency of watching television						
	Not at all	-0.160	0.127	0.853	0.664	1.095	0.211
	Less than once a week	-0.157	0.152	0.855	0.634	1.153	0.304
	At least once a week	Reference		1.000			
	Frequency of using internet last month						
	Not at all	-0.481	0.115	0.618	0.493	0.775	<0.001
	Less than once a week	-0.692	0.360	0.501	0.247	1.015	0.055
	At least once a week	-0.262	0.186	0.770	0.534	1.110	0.160
	Almost every day	Reference		1.000			
	Wealth index combined						
	Poorest	-0.855	0.141	0.425	0.323	0.561	<0.001
	Poorer	-0.590	0.136	0.554	0.424	0.725	<0.001
	Middle	-0.402	0.123	0.669	0.526	0.852	0.001
	Richer	-0.298	0.126	0.743	0.580	0.951	0.019
	Richest	Reference		1.000			
	Respondent currently working						
	No	0.168	0.071	1.183	1.029	1.360	0.018
	Yes	Reference		1.000			
	Current marital status	0.348	1.079	1.416	0.170	11.786	0.747
	Never in union	0.954	1.079	2.595	0.312	21.567	0.377
	Married	1.078	1.085	2.940	0.349	24.736	0.321
	Living with partner	0.741	1.079	2.098	0.252	17.452	0.493
	Widowed	0.767	1.085	2.153	0.256	18.118	0.480
	Divorced	0.866	1.089	2.378	0.280	20.177	0.427
	No longer living together/separated	Reference		1.000			
Obese	Age in 5-year groups						
	15–19	-0.747	0.191	0.474	0.325	0.689	<0.001
	20–24	-0.786	0.165	0.456	0.330	0.629	<0.001
	25–29	-0.653	0.166	0.520	0.375	0.721	<0.001
	30–34	-0.389	0.172	0.678	0.483	0.950	0.024



Exploring sociodemographic determinants of obesity

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
	35–39	–0.132	0.168	0.876	0.630	1.219	0.433
	40–44	0.047	0.164	1.048	0.759	1.446	0.776
	45–49	Reference		1.000			
	Type of place of residence						
	Urban	0.564	0.113	1.757	1.409	2.193	<0.001
	Rural	Reference		1.000			
	Highest educational level						
	No education	–0.283	0.254	0.754	0.458	1.240	0.266
	Primary	–0.352	0.212	0.703	0.464	1.065	0.096
	Secondary	–0.390	0.202	0.677	0.456	1.007	0.054
	Higher	Reference		1.000			
	Region Group						
	Northern	–0.002	0.179	0.998	0.702	1.418	0.989
	Central	0.321	0.131	1.378	1.065	1.783	0.015
	Southern	Reference		1.000			
	Religion						
	Catholic	0.437	0.604	1.549	0.473	5.071	0.469
	CCAP	0.381	0.605	1.464	0.446	4.806	0.529
	Anglican	0.402	0.637	1.495	0.428	5.226	0.528
	Seven days/Baptist	0.274	0.614	1.315	0.394	4.388	0.655
	Pentecostal	0.148	0.609	1.160	0.351	3.832	0.808
	Other Christian	0.319	0.597	1.375	0.426	4.445	0.594
	Muslim	0.229	0.613	1.257	0.377	4.186	0.709
	No religion	Reference		1.000			
	Ethnicity						
	Chewa	–0.404	0.365	0.667	0.326	1.365	0.268
	Tumbuka	–0.258	0.395	0.773	0.356	1.677	0.514
	Lomwe	–0.056	0.383	0.945	0.445	2.007	0.884
	Tonga	–0.090	0.411	0.914	0.408	2.048	0.827
	Yao	–0.098	0.396	0.907	0.417	1.972	0.804
	Sena	–0.779	0.422	0.459	0.200	1.050	0.065
	Nkhonde	–0.662	0.465	0.516	0.207	1.286	0.155
	Ngoni	–0.195	0.381	0.823	0.389	1.740	0.610
	Mang'anja	–0.483	0.414	0.617	0.273	1.392	0.244
	Lambia	–0.118	0.504	0.889	0.330	2.393	0.816
	Ndali	–0.426	0.463	0.653	0.263	1.623	0.359
	Other malawian	Reference		1.000			
	Frequency of listening to radio						



Exploring sociodemographic determinants of obesity

Parameter Estimates							
BMI		B	SE	AOR Lower	95% CI for AOR		
					Upper	p value	
	Not at all	0.125	0.092	1.133	0.945	1.358	0.178
	Less than once a week	0.116	0.110	1.123	0.905	1.393	0.293
	At least once a week	Reference		1.000			
	Frequency of watching television						
	Not at all	-0.158	0.124	0.854	0.669	1.090	0.204
	Less than once a week	-0.055	0.152	0.946	0.703	1.274	0.716
	At least once a week	Reference		1.000			
	Frequency of using internet last month						
	Not at all	-0.505	0.120	0.604	0.477	0.764	<0.001
	Less than once a week	-1.155	0.387	0.315	0.147	0.674	0.003
	At least once a week	-0.344	0.212	0.709	0.467	1.076	0.106
	Almost every day	Reference		1.000			
	Wealth index combined						
	Poorest	-1.053	0.158	0.349	0.256	0.476	<0.001
	Poorer	-0.885	0.160	0.413	0.301	0.565	<0.001
	Middle	-0.959	0.147	0.383	0.287	0.511	<0.001
	Richer	-0.508	0.120	0.602	0.475	0.762	<0.001
	Richest	Reference		1.000			
	Respondent currently working						
	No	-0.013	0.074	0.987	0.854	1.141	0.861
	Yes	Reference		1.000			
	Current marital status						
	Never in union	0.468	0.882	1.596	0.283	9.012	0.596
	Married	0.475	0.890	1.609	0.280	9.237	0.594
	Living with partner	0.531	0.892	1.701	0.295	9.810	0.552
	Widowed	0.693	0.905	2.000	0.339	11.811	0.444
	Divorced	0.603	0.901	1.828	0.312	10.724	0.504
	No longer living together/separated	0.264	0.906	1.302	0.220	7.718	0.771
	Nullified	Reference		1.000			

AOR: Adjusted Odds Ratio; CI: Confidence Interval; SE: Standard Error. Reference category = Normal weight.

Underweight. Compared to women aged 45–49 years, those aged 25–29 (AOR: 0.517; 95% CI: 0.312–0.858; $p = 0.011$), 30–34 (AOR: 0.577; 95% CI: 0.347–0.962; $p = 0.035$), and 35–39 years (AOR: 0.548; 95% CI: 0.345–0.871; $p = 0.011$) had significantly lower odds of being underweight. Regarding wealth index, women in the poorest (AOR: 1.730; 95% CI: 1.091–2.743; $p = 0.020$), poorer (AOR: 1.640;

95% CI: 1.070–2.516; $p = 0.023$), middle (AOR: 1.777; 95% CI: 1.172–2.695; $p = 0.007$), and richer quintiles (AOR: 1.493; 95% CI: 1.006–2.215; $p = 0.046$) all had significantly higher odds of being underweight compared to the richest quintile. Women who were not currently working had significantly higher odds of underweight compared to those who were working (AOR: 1.392; 95% CI: 1.153–



1.681; $p = 0.001$). Place of residence, education, region, religion, ethnicity, media exposure, and marital status were not significantly associated with underweight status.

Overweight. Younger age was significantly associated with lower odds of being overweight. Compared to women aged 45–49 years, those aged 15–19 (AOR: 0.312; 95% CI: 0.219–0.444; $p < 0.001$), 20–24 (AOR: 0.470; 95% CI: 0.352–0.628; $p < 0.001$), and 25–29 years (AOR: 0.646; 95% CI: 0.497–0.839; $p = 0.001$) had significantly lower odds of overweight. Women residing in the Central region had significantly higher odds of overweight compared to those in the Southern region (AOR: 1.418; 95% CI: 1.140–1.763; $p = 0.002$). Women who did not use the internet in the preceding month had significantly lower odds of being overweight compared with those who used it almost daily (AOR: 0.618; 95% CI: 0.493–0.775; $p < 0.001$). Across the wealth index, lower quintiles were all significantly associated with reduced odds of overweight compared to the richest quintile: poorest (AOR: 0.425; 95% CI: 0.323–0.561; $p < 0.001$), poorer (AOR: 0.554; 95% CI: 0.424–0.725; $p < 0.001$), middle (AOR: 0.669; 95% CI: 0.526–0.852; $p = 0.001$), and richer (AOR: 0.743; 95% CI: 0.580–0.951; $p = 0.019$). Women not currently working had higher odds of overweight than those working (AOR: 1.183; 95% CI: 1.029–1.360; $p = 0.018$). Place of residence, education, religion, ethnicity, television watching, radio listening, and marital status were not significantly associated with being overweight.

Obesity. Younger age groups showed significantly lower odds of obesity compared to women aged 45–49 years, including those aged 15–19 (AOR: 0.474; 95% CI: 0.325–0.689; $p < 0.001$), 20–24 (AOR: 0.456; 95% CI: 0.330–0.629; $p < 0.001$), 25–29 (AOR: 0.520; 95% CI: 0.375–0.721; $p < 0.001$), and 30–34 years (AOR: 0.678; 95% CI: 0.483–0.950; $p = 0.024$). Urban residence was significantly associated with higher odds of obesity compared to rural women (AOR: 1.757; 95% CI: 1.409–2.193; $p < 0.001$). Women in the Central region had significantly higher odds of obesity than those in the Southern region (AOR: 1.378; 95% CI: 1.065–1.783; $p = 0.015$). Women who did not use the internet in the preceding month had significantly lower odds of obesity compared with those who used it almost every day (AOR: 0.604; 95% CI: 0.477–0.764; $p < 0.001$). Similarly, women who used the internet less than once a week also had lower odds of obesity (AOR: 0.315; 95% CI: 0.147–0.674; $p = 0.003$). All lower wealth quintiles were significantly associated with reduced odds of obesity compared to the richest quintile: poorest (AOR: 0.349; 95% CI: 0.256–0.476; $p < 0.001$), poorer (AOR: 0.413; 95% CI: 0.301–0.565; $p < 0.001$), middle (AOR: 0.383; 95% CI: 0.287–0.511; $p < 0.001$), and richer (AOR: 0.602; 95% CI: 0.475–0.762; $p < 0.001$). Education, religion, ethnicity, television watching, radio listening, employment status, and marital status were not significantly associated with obesity.

Discussion

Summary of findings

We investigated the prevalence of malnutrition and its associated risk factors in Malawi using nationally representative data from the 2024 DHS database. We found that around one-third of women aged 15–49 years in Malawi were overweight (16.7%) or obese (13.2%). Meanwhile, 5.8% were underweight. On performing multivariable analysis, we found that underweight was associated with lower wealth quintiles and unemployment. Overweight and obesity were associated with older age, higher wealth status, and frequent internet use. Urban residence was associated with obesity, while unemployment increased the odds of being overweight but not obese.

Comparison with the literature

The prevalence of overweight and obesity in this study is consistent with the previous studies, which showed a rising trend in overweight and obesity among women in sub-Saharan Africa [10]. The existence of both underweight and obesity highlights the double burden of malnutrition. This phenomenon is increasingly reported in sub-Saharan Africa owing to socioeconomic and dietary transitions [4]. The prevalence of overweight was 16.7%, which is higher than that reported in 2016 (15%) [10]. Similarly, obesity was prevalent among 6% of women in 2016, while we found that it was prevalent among 13.2% of women [10]. Yet, we found that the prevalence of underweight among women of reproductive age was 5.8%, which is lower than that observed in Malawi in 2016 (7%) [10].

Although adolescents (15–19 years) had the highest prevalence of underweight (9.7%), in the multivariate analysis, we found that no significant association was found between this age group and being underweight. This could be explained as underweight among adolescents could be driven by socioeconomic deprivation or the increased nutritional demands, rather than the age [19]. Meanwhile, we found that women aged 25–39 years had significantly lower odds of being underweight compared to older women (45–49 years). Also, we found that women who were not currently working and those with a lower wealth index had significantly higher odds of being underweight. These findings are consistent with the findings of previous studies and could be explained as women working could have higher income and thus food security [20,21].

The association between employment status and BMI revealed a complex pattern. Although we found that unemployment was associated with being underweight, we found that it was also associated with being overweight but not being obese. Non-employment among food-insecure households could reflect extreme poverty and limited food access. However, among higher-income households, it could reflect a sedentary lifestyle, where individuals have



reduced physical activity while consuming high caloric intake. We found that wealthier women were at a higher risk of being overweight and obese, consistent with previous studies [10,11]. Also, it is possible that these patterns could be due to the different nature of occupations; however, this was not investigated owing to the limited data.

We found that living in urban areas was associated with obesity. These findings are consistent with the findings of previous studies and could be explained by different lifestyles between urban and rural areas [10,13]. Urban residents have a more sedentary lifestyle and are less physically active compared to rural residents. Additionally, they tend to consume more foods that are higher in calories [22,23]. Also, we found that women using the internet daily had higher odds of being overweight or obese compared to women using it once weekly. Similarly, Aghasi et al. found that high use of the internet was associated with a 47% increased risk of being overweight or obese. Every additional 60 minutes of internet use was associated with 8% increased risk of being overweight or obese [24]. This could be explained as internet use is linked to limited physical activity, and the increased probability of snacking, especially when exposed to advertisements of processed drinks and food [25]. Yet, we found no significant association between watching Television (TV) and obesity or overweight, although previous studies found an association between both television and internet use [26]. This might reflect the different content and use patterns associated with these media, with television being relatively less common in Malawi compared to internet-enabled devices. Also, in the multivariate analysis categories, using the internet was compared between daily users and less frequent users. Meanwhile, the analysis using TV included only less frequent use without daily users, which might have led to the insignificant association.

The absence of significant associations between education, religion, and ethnicity suggests that these variables may indirectly affect nutrition status through their association with socioeconomic status and urbanization, rather than having independent effects on BMI. Previous studies in African settings have shown similarly mixed findings regarding education; some studies showed protective effects, while others found no association [27,28].

Strengths and limitations

Our study has several strengths. First, we used nationally representative data from the DHS database to identify determinants of malnutrition in Malawian women. The DHS data collection tool is standardized and validated, thus reducing the potential for bias. Second, we used data from DHS 2024, which represents updated evidence and includes a large sample of 10,590 women. Third, underweight, overweight, and obesity were determined using standardized protocols, minimizing the risk of measurement error that could be present with

self-reported height and weight. We investigated the prevalence and risk factors of underweight, overweight, and obesity, rather than focusing only on obesity.

Our study has some limitations. First, the cross-sectional design limits causal inference. Thus, the observed associations between malnutrition and the observed risk factors need further confirmation in cohort studies. Second, data on important variables were missing, such as dietary intake and physical activity. Third, we only included women aged 15–49 years; thus, further studies should investigate the risk factors of malnutrition among older women, children, and men. Also, BMI does not differentiate between fat mass and lean body mass; thus, it may not accurately reflect body composition differences among women [29]. Although we investigated the impact of employment as a risk factor for malnutrition, there was insufficient data on the analysis of each occupation and its effect.

Clinical implications

Our study provided evidence on the prevalence of malnutrition and risk factors among women aged 15–49 in Malawi. The dual burden of overweight and obesity and underweight highlights the need for an approach that addresses both sides of the malnutrition. For women with lower wealth quintiles, priority should be given to addressing food insecurity and undernutrition. Programs improving access to diverse, nutrient-dense foods and providing nutritional education could reduce undernutrition. For women living in urban areas and those with a high wealth index, programs aiming at reducing obesity and promoting healthy lifestyles and eating practices could be useful. We found that obesity was associated with frequent use of the internet. Thus, educational nutritional campaigns could use social media and targeted digital advertising to promote healthy behaviors.

Conclusion

Malawi faces a dual burden of malnutrition among women of reproductive age. Around one-third of women were overweight or obese. Underweight was significantly associated with unemployment and poverty, while overweight and obesity were significantly associated with living in urban areas, being wealthier, and older age. Public health strategies should address this dual burden of malnutrition. Further longitudinal studies are needed to confirm the causal relation between the identified risk factors and malnutrition.

List of Abbreviations

AORs	Adjusted odds ratios
BMI	Body mass index
CIs	Confidence intervals
DHS	Demographic and Health Survey
NCDs	Non-communicable diseases



Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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Due consent was obtained from all the participants.

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