Socioeconomic Determinants of Sarcopenia among the Elderly Population in Mandera County, Kenya

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Abstract

Sarcopenia, characterized by the progressive loss of skeletal muscle mass, strength, and function, is a significant public health concern among aging populations. Limited data exist in resource-constrained settings like Mandera County, Kenya. This study assessed socioeconomic determinants of sarcopenia among the elderly in Mandera County. The study employed a descriptive cross-sectional design targeting individuals aged 65 years. A sample size of 186 participants was determined using the Cochran (1953) formula, with a multistage sampling approach to ensure representation across sub-counties, wards, and villages. Data collection involved non-structured questionnaires and physical measurements including handgrip strength, calf circumference, gait speed, and MUAC. Findings revealed that 60.7% of participants had confirmed severe sarcopenia. Socioeconomic factors significantly influenced status; 86% of those without health insurance exhibited confirmed or severe sarcopenia, compared to 14% with insurance ($p = 0.019$). Education was a key determinant ($p < 0.001$): 38.0% of those with no formal education and 49.0% with primary education had confirmed or severe sarcopenia, compared to 9.9% with secondary and 4.4% with tertiary education. Marital status ($p = 0.261$), living arrangement ($p = 0.184$), source of income ($p = 0.879$), and profession type ($p = 0.141$) showed no significant correlation. In conclusion, socioeconomic disadvantages contribute to severe sarcopenia. The study underscores the need for enhanced healthcare access for the elderly. It is recommended that county governments integrate routine sarcopenia screening into healthcare programs alongside community-based nutrition and physical activity initiatives. Further research should explore additional biological and environmental factors in similar low-resource settings.

Keywords: *Socio-economic, determinants, sarcopenia, elderly population*

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1.0 Introduction

A progressive loss of muscle mass, strength, and function characterizes sarcopenia. It is a significant health issue worldwide, particularly in aging populations (Papadopoulos et al., 2020). According to recent studies, sarcopenia affects approximately 10-20% of individuals aged 65 and older globally, with prevalence rates increasing with age (Almohaisen et al., 2022). The World Health Organization (WHO) estimates a doubling of individuals aged > 60 years from 2015 to 2050, reaching nearly 2.1 billion, highlighting the growing impact of sarcopenia on global health systems (Wang et al., 2012).

Sarcopenia poses a significant challenge across diverse economic settings worldwide. In Japanese communities with aging populations, the prevalence of sarcopenia is notably high, with reported rates of 21.8% in men and 22.1% in women (Yamada et al., 2013). However, prevalence rates vary widely depending on the criteria used, ranging from 9.9% to 40.4% (Mayhew, 2018). Specifically, among Japanese older adults, the overall prevalence of sarcopenia is 9.9%, with no significant gender difference (Makizako, 2019). Globally, the prevalence of sarcopenia is estimated at 11% among older men and 9% among women, with even higher rates among those in nursing homes or hospitalized (Papadopoulos et al., 2019). These variations underscore the need for further research and the establishment of standardized definitions to address the prevalence of sarcopenia across diverse populations effectively. The unique socioeconomic and environmental factors in Mandera County, Kenya, contribute to a range of health challenges, including sarcopenia. These factors include food insecurity, poor dietary practices, and high rates of malnutrition, particularly among the elderly (Kamwana, 2021). Malnutrition among the elderly is a matter of considerable concern, with poor dietary practices and low energy intake being key contributing factors (Kamwana, 2021). The elevated incidence of malnutrition among the elderly in Mandera necessitates research on sarcopenia that manifests alongside acute malnutrition cases. Healthcare infrastructure and access significantly influence the detection and management of sarcopenia among the elderly population. Limited availability of medical facilities, healthcare professionals, and diagnostic tools may hinder early intervention and exacerbate the effects of sarcopenia on individuals' health (Pillatt et al., 2018). Addressing these healthcare disparities is crucial for ensuring equitable access to preventive and treatment services for sarcopenia.

Socioeconomic factors, including poverty, educational level, and access to nutritious food, are crucial determinants of the prevalence and severity of sarcopenia. Cultural norms and dietary habits unique to the region may also influence protein intake and physical activity patterns among the elderly population. Understanding these sociocultural determinants is essential for developing culturally sensitive interventions that resonate with the community and promote healthy aging practices (Poggiogalle et al., 2021).

Examining the prevalence, determinants, and potential interventions for sarcopenia among the elderly population in Mandera County requires a comprehensive understanding of factors such as dietary habits, physical activity levels, healthcare infrastructure, and socioeconomic determinants. Addressing these challenges through targeted interventions and healthcare policies can improve the health of elderly individuals in the region.

Statement of the Problem

Despite growing recognition of sarcopenia as a global health issue, there is limited data on sarcopenia cases in Sub-Saharan Africa, including Kenya (Peterson & Braunschweig, 2015). According to a systematic review published in the Journal of Cachexia, Sarcopenia and Muscle, the prevalence of sarcopenia in the elderly population in Sub-Saharan Africa ranges from 5% to 25%. Nonetheless, these estimates rely on a limited pool of studies and might not fully capture the actual extent of sarcopenia in the region (Almohaisen et al., 2022). A systematic review of the literature on sarcopenia in Africa

(including 17 studies, ~12,690 people) reports a pooled prevalence of 25% in Africa (CI 19-30%). However, the reviews noted that data on sarcopenia in East Africa, particularly in Kenya and neighboring countries, are limited or absent.

In Mandera County, there is limited data on sarcopenia assessment among the elderly. Protein intake maintains muscle mass and function, yet more than 25% of older adults in low-resource settings such as Mandera may have inadequate access to protein-rich foods (Paddon-Jones et al., 2015). Socioeconomic disparities may further exacerbate protein inadequacy among the elderly population in Mandera County (Deer & Volpi, 2015). Thus, it is imperative to conduct further investigation to gain a more comprehensive understanding of the prevalence of sarcopenia in Sub-Saharan Africa, especially in resource-constrained environments such as Mandera County. Therefore, assessing the socioeconomic determinants of sarcopenia among the elderly population in Mandera County was timely and helped address knowledge gaps in Kenya.

"The study revealed that while socioeconomic factors such as education and access to health services influence sarcopenia, other factors, such as income and living arrangements, have a less direct impact."

2.0 Materials and Methods

The research was conducted in Mandera County and employed a cross-sectional field design. The study focused on males and females aged 65 years. The elderly population in Mandera County is estimated at 5,121 people. The Cochran formula (1953) was used to determine the study's sample size of 186 elderly, which is appropriate for estimating prevalence in a population of less than 10,000. The study adopted a multi-stage sampling technique. The study area (county) was stratified by sub-county, and each sub-county was further stratified into administrative units called wards. Households of the elderly were selected by random sampling. Data collection involved structured questionnaires and physical anthropometric measurements using gadgets for handgrip, leg calf, gait speed, MUAC, and BMI. Validating tools such as the International Physical Activity Questionnaire (IPAQ) and the SARC-F screening tool for sarcopenia assessment were used. The Statistical Package for Social Sciences (SPSS) was the primary tool for data analysis, generating chi-square tests and descriptive and inferential statistics. Ethical considerations were addressed, including obtaining research permission, maintaining anonymity and confidentiality, and ensuring data integrity. NACOSTI, KEMUERC, and the County administration were contacted for clearance to ensure strict adherence to established ethical standards. All participants consented prior to the interview process.

3.0 Results and Discussion

The study included 150 participants with a mean age of 74.5 years (SD = 7.8), indicating an elderly population. The mean monthly household income was KES 8,235.6, reflecting modest economic conditions. Females made up a slight majority at 51.3% (n = 77), while males comprised 48.7% (n = 73). Regarding education, 36.7% (n = 55) had completed primary education, 28.7% (n = 43) reported no formal education, and only 14% (n = 21) had tertiary education.

By marital status, 29.3% (n = 44) were single, 26.7% (n = 40) were married, 22.7% (n = 34) were divorced or separated, and 21.3% (n = 32) were widowed. Occupations were distributed among farmers (24.0%), traders (24.0%), retirees (19.3%), pastoralists (16.7%), and other occupations (16.0%). Living arrangements varied, with 31.3% living alone, 28.0% with children, 24.0% in extended families, and 16.7% with spouses. Sources of income were reported as family support (22.7%), farming (17.3%), livestock (20.0%), pensions (20.0%), and 20.0%

reported having no source of income. A significant proportion (80.7%) lacked health insurance coverage. However, 69.3% reported having access to health services, while 30.7% did not.

The findings of this study align with the existing literature, highlighting key demographic and socioeconomic factors commonly observed in elderly populations in low-resource settings. The mean age of 74.5 years confirms that sarcopenia predominantly affects older adults, consistent with previous studies indicating increased vulnerability to sarcopenia with advancing age (Hämäläinen et al., 2024a). The modest household income observed reflects similar patterns documented in Sub-Saharan Africa, where economic constraints often limit access to quality healthcare and adequate nutrition, both of which are critical for the prevention and management of sarcopenia (Bain et al., 2013). The near-equal distribution of males and females in this study contrasts with findings in some Western contexts, where females often constitute a higher proportion of elderly populations; however, the association of male sex with increased sarcopenia risk in this study aligns with the literature indicating that men experience more rapid declines in muscle mass and strength due to hormonal and behavioral factors (Metanmo et al., 2025). The low levels of formal education among participants mirror findings in rural and underserved populations, where educational attainment remains a barrier to health literacy and engagement with preventive health measures (Patel et al., 2022). Additionally, the high proportion of participants without health insurance aligns with prior research in similar settings, underscoring the role of financial barriers in delaying the diagnosis and management of age-related conditions (Coughlin et al., 2020). Although most reported access to health services, the lack of insurance may still limit the quality and continuity of care. Collectively, these findings align with current evidence underscoring the interplay among socioeconomic disadvantages, limited education, and inadequate health coverage as critical determinants of sarcopenia risk and progression in aging populations.

Table 1

Respondents Description

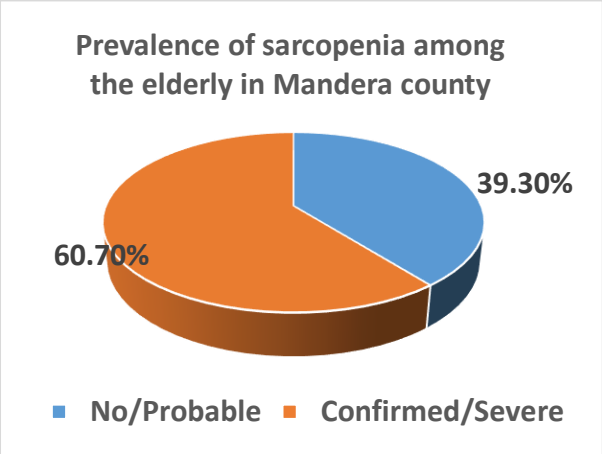
	N (%)
Age in Years	74
Monthly Household Income (KES)	8,235
Sex of Respondent	
Female	77 (51.3%)
Male	73 (48.7%)
Level of Education	
No formal education	43 (28.7%)
Primary	55 (36.7%)
Secondary	31 (20.7%)
Tertiary	21 (14.0%)
Marital Status	
Divorced/Separated	34 (22.7%)
Married	40 (26.7%)
Single	44 (29.3%)
Widowed	32 (21.3%)
Occupation Type	
Farmer	36 (24.0%)
Other	24 (16.0%)
Pastoralist	25 (16.7%)
Retired	29 (19.3%)
Trader	36 (24.0%)
Living Arrangement	
Alone	47 (31.3%)
Extended family	36 (24.0%)
With children	42 (28.0%)
With spouse	25 (16.7%)
Source of Income	
Family support	34 (22.7%)
Farming	26 (17.3%)
Livestock	30 (20.0%)
None	30 (20.0%)
Pension	30 (20.0%)
Has Health Insurance	
No	121(80.7%)
Yes	29 (19.3%)
Access to Health Services	
No	46 (30.7%)
Yes	104 (69.3%)

N=150

Prevalence of sarcopenia

Figure 1

Prevalence of Sarcopenia



According to the study, 33.3% of older subjects had no or suspected sarcopenia, whereas 66.7% had verified or severe sarcopenia. This suggests that a significant number of Mandera County's senior citizens suffer from sarcopenia. Given its high incidence, sarcopenia appears to be a serious public health issue in this context, possibly driven by age, inadequate diet, sedentary lifestyles, and limited access to medical care. This finding aligns with previous research highlighting sarcopenia as a growing public health concern in aging populations, particularly in low-resource settings where risk factors such as inadequate protein intake, sedentary lifestyles, and limited access to healthcare are prevalent (Veronese et al., 2024). The high prevalence observed in this study mirrors similar findings in other contexts, where socioeconomic deprivation and limited health literacy further exacerbate sarcopenia risk among older adults (Swan et al., 2021).

Socioeconomic determinants of sarcopenia among the elderly population in Mandera County, Kenya

Table 2

Socio-economic determination

	Sarcopenia Status			
	No/Probable	**Confirmed**	**Total**	**Chi-Square Test**
N	69 (39.3%)	91 (60.7%)	150(100.0%)	
Monthly Household Income (KES)	(7,769.260)	(8,468.780)	8,235.607	0.318
Sex of Respondent				
Female	34 (68.0%)	43 (43.0%)	77 (51.3%)	0.004
Male	16 (32.0%)	57 (57.0%)	73 (48.7%)	
Level of Education				
No formal education	5 (10.0%)	38 (38.0%)	43 (28.7%)	<0.001
Primary	6 (12.0%)	49 (49.0%)	55 (36.7%)	
Secondary	22 (44.0%)	9 (9.0%)	31 (20.7%)	
Tertiary	17 (34.0%)	4 (4.0%)	21 (14.0%)	
Marital Status				
Divorced/Separated	11 (22.0%)	23 (23.0%)	34 (22.7%)	0.261
Married	17 (34.0%)	23 (23.0%)	40 (26.7%)	
Single	10 (20.0%)	34 (34.0%)	44 (29.3%)	
Widowed	12 (24.0%)	20 (20.0%)	32 (21.3%)	
Occupation Type				
Farmer	15 (30.0%)	21 (21.0%)	36 (24.0%)	0.141
Other	3 (6.0%)	21 (21.0%)	24 (16.0%)	
Pastoralist	7 (14.0%)	18 (18.0%)	25 (16.7%)	
Retired	11 (22.0%)	18 (18.0%)	29 (19.3%)	
Trader	14 (28.0%)	22 (22.0%)	36 (24.0%)	
Living Arrangement				
Alone	13 (26.0%)	34 (34.0%)	47 (31.3%)	0.184
Extended family	11 (22.0%)	25 (25.0%)	36 (24.0%)	
With children	13 (26.0%)	29 (29.0%)	42 (28.0%)	
With spouse	13 (26.0%)	12 (12.0%)	25 (16.7%)	

Source of Income				
Family support	13 (26.0%)	21 (21.0%)	34 (22.7%)	0.879
Farming	8 (16.0%)	18 (18.0%)	26 (17.3%)	
Livestock	10 (20.0%)	20 (20.0%)	30 (20.0%)	
None	8 (16.0%)	22 (22.0%)	30 (20.0%)	
Pension	11 (22.0%)	19 (19.0%)	30 (20.0%)	
Has Health Insurance				
No	35 (70.0%)	86 (86.0%)	121 (80.7%)	0.019
Yes	15 (30.0%)	14 (14.0%)	29 (19.3%)	
Access to Health Services				
No	15 (30.0%)	31 (31.0%)	46 (30.7%)	0.900
Yes	35 (70.0%)	69 (69.0%)	104 (69.3%)	

Based on the findings, 60.7% of the participants had confirmed or severe sarcopenia, while 39.3% had neither. Participants in the no or probable group reported a mean monthly household income of KES 7,769.26 (SD = 4,420.55), whereas those with confirmed or severe sarcopenia reported a mean of KES 8,468.78 (SD = 3,822.73) ($p = 0.318$). There was no significant difference in monthly household income between the groups. Males were more likely than females to have sarcopenia (57.0%) compared with 43.0% ($p = 0.004$). The relationship between education and sarcopenia was strongly evident, with higher education levels being protective against sarcopenia. This result is consistent with Lv et al. (2024), who emphasize that education lowers the incidence of sarcopenia by influencing health literacy, dietary quality, and participation in preventive health practices. Education level was further confirmed as a significant predictor of sarcopenia status ($p < 0.001$). Compared with 9.0% of those with secondary and 4.0% of those with tertiary education, 38.0% of those with no formal education and 49.0% of those with primary education had confirmed or severe sarcopenia.

Sarcopenia and marital status did not correlate substantially ($p = 0.261$). Likewise, there was no significant correlation between sarcopenia status and living arrangement ($p = 0.184$), source of income ($p = 0.879$), or profession type ($p = 0.141$). The prevalence of sarcopenia was higher among those without health insurance (86.0%) than among those with insurance (14.0%) ($p = 0.019$). Sarcopenia and health service accessibility did not correlate substantially ($p = 0.900$). The study findings showed that sarcopenia was highly prevalent among the elderly participants, with males being significantly more affected than females (Hwang & Park, 2022).

The mean age of participants with sarcopenia was marginally higher than that of those without, but the difference was not statistically significant (Lee, 2025). This contrasts with other studies. In contrast to some previous research, such as Wan et al. (2024), which found socioeconomic status to be a significant determinant of nutritional intake and healthcare access—both known factors in the development of sarcopenia—this study found no significant correlation between sarcopenia and monthly household income. The lack of discernible correlations between sarcopenia and occupation, housing situation, income source, or marital status supports earlier research indicating that social factors may have less direct impact than biological and behavioral determinants. The study concludes that those without health insurance had a higher likelihood of developing sarcopenia, supporting data from low- and middle-income nations that show that not having insurance is linked to reduced access to preventive and rehabilitative care, which exacerbates health disparities in older populations (Jacob et al., 2023). Overall, these findings reinforce existing literature emphasizing the complex interplay among biological sex, education, and access to health systems in shaping sarcopenia outcomes, while suggesting that income and household structure may play a less direct role in this population.

Multivariate regression

Table 3

Logistic Regression

Sarcopenia Status	Odds ratio	[95% conf. interval]		P>|0.05|
Education				
Primary	0.997	0.191	5.198	*0.997*
Secondary	0.002	0.000	0.029	*0.001*
Tertiary	0.001	0.000	0.017	*0.001*
Sex				
Male	114.900	8.793	1501.347	*0.001*
Marital Status				
Married	0.763	0.127	4.604	*0.768*
Single	6.206	0.891	43.224	*0.065*
Widowed	1.683	0.270	10.469	*0.577*
Occupation				
Other	4.684	0.378	57.988	*0.229*
Pastoralist	1.157	0.133	10.082	*0.895*
Retired	1.368	0.166	11.274	*0.771*
Trader	0.775	0.132	4.570	*0.779*
Living Arrangement				
Extended family	0.510	0.085	3.062	*0.462*
With children	2.309	0.381	13.990	*0.362*
With spouse	0.838	0.135	5.224	*0.85*
Health Insurance	0.242	0.043	1.354	*0.106*
Physical activity	0.115	0.034	0.389	*0.001*
Protein intake	0.476	0.193	1.174	*0.107*
_cons	14246	81	2503469	*0.001*

Multiple significant predictors of confirmed or severe sarcopenia were identified by multivariate logistic regression analysis. Approximately 115 times as many men as women had verified or severe sarcopenia (OR = 114.9, 95% CI: 8.793–1501.347, p = 0.001), indicating a strong association between male sex and an increased likelihood of sarcopenia. Higher education was protective against sarcopenia. The odds of sarcopenia were considerably lower for participants with secondary education than for those without formal education (OR = 0.002, 95% CI: 0.000–0.029, p = 0.001), and they were likewise lower for participants with higher education (OR = 0.001, 95% CI: 0.000–0.017, p = 0.001).

4.0 Conclusion

The study revealed that while socioeconomic factors such as education and access to health services influence sarcopenia (P < 0.05), other factors, such as income and living arrangements, have a less direct impact. Education emerged as a key determinant of health behaviors relevant to sarcopenia prevention (P<0.001). This objective was achieved by identifying specific socioeconomic factors that either protect against or contribute to the risk of sarcopenia.

5.0 Recommendations

Local policymakers should prioritize interventions that enhance education and health literacy among older adults to improve health behaviors related to sarcopenia prevention. Efforts should expand access to affordable

healthcare services and health insurance for the elderly. Programs that reduce social and economic barriers to healthcare access should be strengthened.

Recommendations for Further Research

Further studies should disaggregate the effects of socioeconomic factors, including income, education, and healthcare access, on sarcopenia outcomes. Qualitative research could provide deeper insights into how cultural beliefs and social norms influence health behaviors related to aging. Broader research should examine how policy changes affect health outcomes among older adults in similar settings.

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