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Research Article

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Minimum Dietary Diversity among Women of Reproductive Age (15-49 Years) in Sheikh Othman District, Aden Governorate-Yemen

Somiya Gutbi Salim[1], Al-Baghdadi Mohammed Ali [2], Aqdar Alawi Mohammed Saif [3], Anisa Taha Saleh Salem [3], Ayat Abd Aljabarr Yahya [3], Fatima Mokhtar Ahmed [3], Fatima Qased Saleh [3], Muhra Amer Naser [3], Muna Maged Darwesh Saleh [3], Ramlah Hasan Abdo Ali [3], Rneem Saleh Othman Salem [3], Roqia Mohammed Ahmed Alazazi [3], Sabah Abdulatef Ali Awadh [3], Sala Ebrahim Mohammed Al-shawafi [3], Sumaia Ammar Abdo Alqawy [3], Thuraya Waleed Mohammed Qaid [3]

[1] Clinical Nutrition & dietetics, Department of Health Sciences, Faculty of Medicine and Health Science, University of Science & Technology-Aden - Yemen
[2] Department of Basic Science, Faculty of Medicine and Health Science, University of Science & Technology-Aden- Yemen
[3] Graduate Students of Clinical Nutrition & dietetics, Department of Health Sciences, Faculty of Medicine and Health Science, University of Science & Technology-Aden-Yemen.

[*]*Corresponding author: Prof: Somiya Gutbi Salim, PhD in Nutrition and Health.*
E-mail: m.albaghdadi@ust.edu , Somiyagutbi@gmail.com

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Abstract:

Background: It is important for women of reproductive age (WRA) in particular to consume adequate macro- and micronutrients to maintain optimal health. The whole of dietary variety, or the Minimum Dietary variety for WRA (MDD-W), is recommended as a simple indicator to identify women of reproductive age who are at risk. The aims of the study were to assess minimum dietary diversity intake among Yemeni women of reproductive age in Sheikh Othman district in Aden governorate. **Methods**: A cross-sectional study was conducted from September 5, 2023, to May 29, 2024 in Sheikh Othman District-Aden Governorate. The sample size was selected through stratified random techniques based on geographical location. Data were collected using a structured questionnaire that included information on socio-demographic characteristics, anthropometric measurements, and minimum dietary diversity intake. This information was obtained using the 24-hour recall method, and food group scores were calculated. The data collected were then analyzed using statistical software (version 26) to determine the prevalence of minimum dietary diversity intake among the study population. Descriptive statistics such as mean, standard deviation, and percentages were calculated to summarize the data. Additionally, inferential statistics such as chi-square tests were used to assess the association between variables. **Results**: The

study revealed that 38.3% of women aged 20-29 years old, 49.5% of them from families comprising 4-6 members, 33.9% had a university degree, and 36.5% were employed in the public sector. Furthermore, 45.3% of them had low incomes. Regarding minimum dietary diversity, 66. % of the women had low dietary diversity scores (<5), while 34% scored high. Cereals and starchy were the most predominantly consumed foods (99.7%). The average BMI among women of reproductive age was 24.35 SD±5.21 kg/m², waist circumference was 80.96cm SD±13.24, and waist-to-height ratio was 0.51 SD±0.08. The study also noted significant associations between family size and waist circumference with dietary diversity scores (P-values 0.02 and 0.03, respectively). **Conclusion**: The results suggest an intricate link between socio-demographic factors and minimum dietary diversity in women of reproductive age. Several individuals in this demographic face obstacles like inadequate income and restricted food choices. Specific eating patterns, like excessive consumption of grains and starchy foods, may impact their well-being and nutritional status. Further research is required to thoroughly investigate these connections and create specific interventions.

Keywords: Minimum Dietary Diversity; Reproductive age; Waist circumference; Cereal and starchy foods

INTRODUCTION

Dietary diversity is a qualitative measure of food consumption that reflects household and individual access to a variety of foods and is also a proxy for nutrient adequacy of the diet of individuals (FAO, 2018). A diverse diet determines nutrient adequacy because no one food item can meet the nutritional requirements of an individual (Arimond and Deitchler, 2019).

The reference period of dietary diversity varies, but a 24-hour recall period is mostly used as stated by the Food Agriculture Organization (FAO, 2016). The Minimum Dietary Diversity for women (MDD-W) is a dichotomous indicator based on 10 recommended food groups for MDD-W that reflect adequacy for 11 micro-nutrients. These food groups include grains, white roots and tubers, plantains, pulses (beans, peas, and lentils), nuts and seeds, milk and milk products, meat, poultry, fish, eggs, dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other vegetables, and other fruits (FAO,2021).

Yemen is one of the most intricate and pervasive humanitarian crises in the world. For millions of people, the COVID-19 pandemic, over nine years of armed conflict, a persistent economic crisis, frequent natural disasters, and crippled public services are still problems. Yemen presently has a score of 0.455, placing it 183rd out of 191 countries in the Human Development Index for 2021–2022. The majority of people—more than 80%—have trouble getting enough food, clean water to drink, and good healthcare (UNICEF, 2023).

Across sectional study of 480 Yemini women across governorates in Yemen, 94% of the subjects did not meet the MDD-W and had no more than three food groups in their diet the day before the research. Though less than 10% of the women in these groups ate nutrient-dense food groups such as vitamin-rich fruits and vegetables, eggs, nuts, seeds, and other fruits, 100% of the women with below-MDD diets consisted of grains and only included starchy staples, pulses, and dairy products (WFP, 2019).

A study in the Sana'a governorate of Yemen focused on two zones: the rural area, designated as Dry (SD), and the urban area, designated as Temperate (ST). According to the findings, 71% of women

who are fertile or older ate less than five of the ten food groups. Furthermore, less than $1 was the daily income for 85.5% of women who were of reproductive age. The findings also revealed that the highest rates of MUAC are seen in women who eat cereals, grains, oils, sugar, honey, dairy, and legumes, while the lowest rates are found in those who eat meat, fruits, eggs, and seafood (Masood & Al Mansoob, 2021).

Yemen's humanitarian crisis persists after nine years of conflict, compounded by economic woes, natural disasters, and the COVID-19 pandemic (McGowan, et al., 2023). Yemen faces severe challenges in accessing nutrition, clean water, and healthcare. A survey found that 94% of Yemeni women didn't meet minimum dietary diversity, primarily relying on starchy staples and lacking nutrient-rich foods like fruits and vegetables. Another study in Sana'a governorate showed that 71% of reproductive-age women consumed fewer than five food groups. Malnutrition rates were highest among those consuming cereals and oils, while lower among consumers of meat, fruits, eggs, and seafood (WFP, 2019; Masood & Al Mansoob, 2021).

Studying minimum dietary diversity among women of reproductive age is important because it ensures they receive essential nutrients needed for their health and that of their babies during pregnancy and lactation. Insufficient dietary diversity can lead to micronutrient deficiencies. Limited studies exist on dietary diversity among Yemeni women of reproductive age.

This study aims to assess dietary diversity in the Sheikh Othman area of Aden governorate. The study undoubtedly contributed to the information essential for an evidence-based intervention program to improve the dietary diversity status of Yemeni women of reproductive age in this area.

METHODOLOGY

Study Design and study duration

This cross-sectional study was carried out in the Sheikh Othman district of Aden governorate from September 1, 2023, to May 29, 2024, with a focus on women aged between 15 to 49 years. The objective of the research was to evaluate different factors concerning this demographic. It utilized a structured methodology to collect information within the designated geographical region. Exclusion criteria were in place to prevent the participation of individuals outside the specified age range, thereby ensuring the study's concentration on reproductive health and associated matters pertinent to women in this particular age bracket within the district.

Sample Size and Procedure

The population figures for Sheikh Othman district in the Aden Governorate are currently unknown to address this, the population sample is calculated using the following formula

$n = z^2 x \hat{p} (1-\hat{p}) / \varepsilon^2$

$n = 1.96^2 x 0.5(1-0.5) / 0.05^2 = 384$

Sample Size Determination

A stratified multi-stage sampling technique is employed to allocate the sample among women of reproductive age. Initially, researchers utilized a simple random technique to select the study area in Aden Governorate. This process involved writing the names of the existing districts on pieces of paper, folding them, and placing them in a container. The container was then shaken to mix the contents, and one paper was randomly selected. Sheikh Othman District was chosen to represent women of reproductive age in the governorate. The data collection took place from November 2, 2023, to January 15, 2024 the researchers randomly selected five houses and then picked a house number between one and five. They then systematically chose houses for the sample size.

Data Collection

The following diagram shows the data collection.

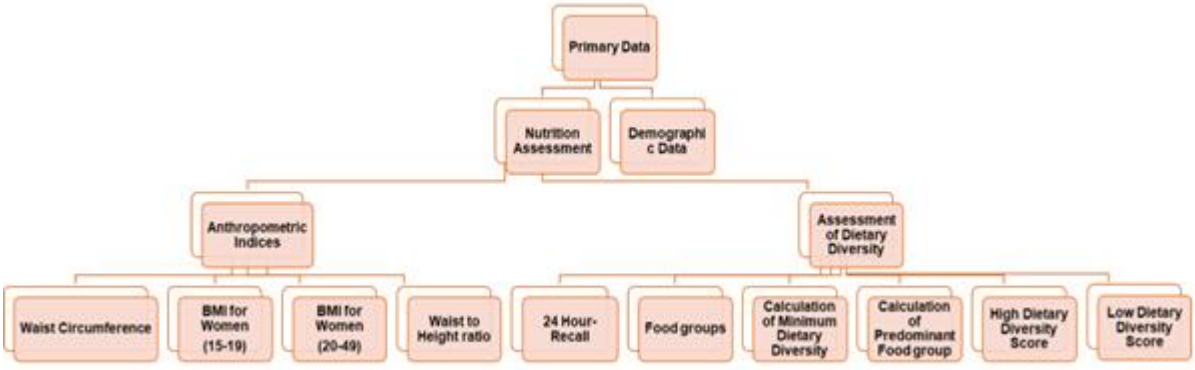

Figure 1: Diagram of the Data Collection.

Data Collection

Secondary data were collected from published, articles, books reports, and Internet sources.

Data analysis

The data gathered were analyzed using SPSS (version 26). Findings were illustrated in tables displaying frequency distributions with corresponding percentages, mean values, standard deviations for specific variables, and chi-square tests to explore potential relationships among the study variables. These assessments sought to determine the presence of a notable connection between two nominal (categorical) variables. Usually, a p-value below 0.05 is deemed statistically significant, suggesting substantial associations.

Ethical consideration

The study was conducted with utmost ethical considerations. Obtaining ethical consent from both the university's research committee and the district administration demonstrates a commitment to ensuring that the research was conducted responsibly and with respect for the participants' rights and well-being. Verbal consent from the women in Sheikh Othman District.

RESULTS

Table (1): Minimum dietary diversity score of food groups consumed by women of reproductive age 15-49 years.

Dietary diversity score	No.	%
Consumption of < 5 food group	254	66
Consumption of ≥5 food group	130	34
Total	**384**	**100**

Table (2): Consumption of each food group among women aged 15-49 years old.

Food Groups	No=0		Yes-1	
	No.	%	No.	%
Cereal and starchy food	1	0.3%	383	99.7%
Legumes (beans, peas, and lentils)	191	49.7%	193	50.3%
Nuts and seeds	367	95.6%	17	4.4%
Milk and milk products	153	39.8%	231	60.2%
Meat:				
Red meat (lamp or goat and beef)	370	96.4%	14	3.6%
Fish	254	66.1%	130	33.9%
Poultry	257	66.9%	127	33.1%
Eggs	277	72.1%	107	27.9%
Dark green leafy vegetables	346	90.1%	38	9.9%
Vegetables and fruits rich in vit A:				
Vitamins A-rich vegetables	335	87.2%	49	12.8%
Vitamin A-rich fruits	363	94.5%	21	5.5%
Other vegetables	221	57.6%	163	42.4%
Other fruits	320	83.3%	64	16.7%

Table (3): BMI in Women Aged 15-49 years.

Women at reproductive age of 15-49 years old		**Classification of BMI**	**No**	**%**
BMI for women in the age group of 15-19	Underweight	Less than 5th percentile	8	2%
	Normal weight	5th percentile to less than the 85th percentile	42	11%
	Overweight	8 5th percentiles to less than the 95th percentile	7	1.8%
	Obese	95th percentile or greater	3	0.8%
Total			**60**	**15.6**
BMI for women in the age group of 20-49 years old	Underweight	<18.5	37	9.6%
	Healthy weight	18.5-24.9	136	35.4%
	Overweight	25-29.9	97	25.3%
	Obese-Class I	30-34.9	44	11.5%
	Obese-Class II	35-39.9	7	1.8%
	Morbid obesity	≥40	3	0.8
Total			**324**	**84.4%**

Table (4): Waist Circumference & Waist-to-Height Ratio of Women Aged 15-49 Years.

		N	**%**
Waist Circumference	Below 80cm (Low risk)	212	55.2%
	80–88cm (High risk)	65	16.9%
	More than 88cm (Very high risk)	107	27.9%
Total		**384**	**100%**
Waist-to-Height Ratio	(<0.4) Chili region (should take care)	30	8%
	(0.4-<0.5) Pear region (health OK)	176	46%
	(0.5-0.6) Pear-apple region (should consider action)	131	34%
	(>0.6) Apple region (A person's health is probably at risk).	47	12%
Total		**384**	**100%**

The association between the minimum dietary diversity score & sociodemographic variables among women of reproductive age 15-49 years old; was evaluated by *chi-square* (x^2)*-test*. hence, there no a statistically significant association was found between the minimum dietary diversity score and other socio-demographic variables, except for except for family size ***(P=0.02)***, as seen in **Table (5)**.

The association between minimum dietary diversity score & anthropometric indices in women of reproductive age 15-49 years; was evaluated by *chi-square* (x^2)*-test*, and represented in **table (6)**.

Table (5): The Association Between the Minimum Dietary Diversity Score & Sociodemographic Variables Among Women of Reproductive Age 15-49 Years Old.

1- Association between Minimum Dietary Diversity Score & Grouped Age					
Food Group (n)	**Grouped Age**				**P-Value**
	15-19	**20-29**	**30-39**	**40-49**	
< 5 (254)	42(16.5%)	100(39.4%)	53(20.9%)	59(23.2%)	**0.6**
≥ 5 (130)	18(13.8%)	46(35.4%)	33(25.4%)	33(25.4%)	
Total (384)	**60(15.6%)**	**146(38.0%)**	**86(22.4%)**	**92(24.0%)**	
2- Association between Minimum Dietary Diversity Score & Marital Status					
Food Group (n)	**Marital status**				**P-Value**
	Single	**Married**	**Divorced**	**Widowed**	
< 5 (254)	125(49.2%)	101(39.8%)	17(6.7%)	11(4.3%)	**0.5**
≥ 5 (130)	53(40.8%)	62(47.7%)	9(6.9%)	6(4.6%)	
Total (384)	**178(46.4%)**	**163(42.4%)**	**26(6.8%)**	**17(4.4%)**	
3- Association between Minimum Dietary Diversity Score & Family Size					
Food Group (n)	**Family size**				**P-Value**
	1-3	**4-6**	**Greater than 6**		
< 5 (254)	56(22%)	128(50.4%)	70(27.6%)		**0.02**
≥ 5 (130)	38(29.2%)	62(47.7%)	30(23.1%)		
Total (384)	94(24.5%)	190(49.5%)	100(26.0%)		
4- Association between Minimum Dietary Diversity Score & Education Level					
Food Group (n)	**Education Level**				**P-Value**
	1	**2**	**3**	**4**	**5**
< 5 (254)	18(7.1%)	60(23.6%)	78(30.7%)	85(33.5%)	13(5.1%)	**0.9**
≥ 5 (130)	6(4.6%)	30(23.1%)	41(31.5%)	45(34.6%)	8(6.2%)	

Total (384)	**24(6.2%)**	**90(23.4%)**	**119(31%)**	**130(33.9%)**	**21(5.5%)**	
Illiterate (1), Primary (2), Secondary (3), University (4), Postgraduate (5).						
5- Association b/t Minimum Dietary Diversity Score & Type of Occupations						
Food Group (n)	**Type of Occupation**					**P-Value**
	Housewives	**Government**	**Business**	**Other**		
< 5 (254)	61(24%)	93(36.6%)	37(14.6%)	63(24.8%)		**0.9**
≥ 5 (130)	35(26.9%)	47(36.2%)	17(13.1%)	31(23.8%)		
Total (384)	**96(25.0%)**	**140(36.5%)**	**54(14.0%)**	**94(24.5%)**		
6- Association between Minimum Dietary Diversity score & Income Level						
Food Group (n)	**Income Level (R.Y)**					**P-Value**
	Very low	**Low**	**Moderate**	**Above moderate**	**High**	
< 5 (254)	11(4.3%)	121(47.6%)	79(31.1%)	37(14.6%)	6(2.4%)	**0.5**
≥ 5 (130)	7(5.4%)	53(40.8%)	45(34.6%)	24(18.5%)	1(0.8%)	
Total (384)	**18(4.7%)**	**174(45.3%)**	**124(32.3%)**	**61(15.9%)**	**7(1.8%)**	
Very Low; >35000, Low; 35000-149000, Moderate; 150000-200000, Above moderate; 201000-399000, High; ≥400000, R.Y; Rial Yemeni						

Table (6): Association between Minimum Dietary Diversity Score & Anthropometric indices in women of reproductive age 15-49 years.

1- Association between Minimum Dietary Diversity Score & BMI											
Food Group	**Classification of BMI**										**P-value**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
A	30(11.8%)	86(33.9%)	63(24.8%)	27(10.6%)	4(1.6%)	0(0%)	4(1.6%)	32(12.6%)	5(2%)	1(0.4%)	
B	7(5.4%)	50(38.5%)	34(26.2%)	17(13.1%)	3(2.3%)	3(2.3%)	4(3.1%)	10(7.7%)	2(1.5%)	2(1.5%)	**0.3**
Total	**37(9.6%)**	**136(35.4%)**	**97(25.3%)**	**44(11.5%)**	**7(1.8%)**	**3(0.8)**	**8(2.1%)**	**42(10.9%)**	**7(1.8%)**	**3(0.8%)**	
Underweight (1), Normal healthy weight (2), Overweight (3), Obese-Class I (4), Obesity class11 (5), Morbid obesity (6), Less than 5th (7) 5th-less than 85th (8), 85th less than 95th (9), 95th or greater (10), **A: Dietary diversity score Less than 5 (254)**, **B: 5 and above (130)**.											
2- Association between Minimum Dietary Diversity Score & Waist Circumference											
Food Group	**Waist Classification**										**P-value**
	Low risk <80cm		**High risk 80-88cm**		**Vert High Risk >88cm**						
A	149(58.7%)		42(16.5%)		63(24.8%)						
B	63(48.5%)		23(17.7%)		44(33.8%)						**0.03**
Total	**212(55.2%)**		**65(16.9%)**		**107(27.9%)**						
Dietary diversity score Less than 5 (254), **B: 5 and above (130)**.											
3- Association between Minimum Dietary Diversity Score & Waist-Hight Ratio											
Food Group	**Waist-Hight Ratio**										**P-value**
	< 0.4		**0.4-<0.5**		**0.5-0.6**				**> 0.6**		
A	23(9.1%)		122(48.0%)		82(32.3%)				27(10.6%)		
B	7(5.4%)		54(41.5%)		49(37.7%)				20(15.4%)		**0.2**
Total	**30(8%)**		**176(46%)**		**131(34%)**				**47(12 %)**		
< 0.4 Should "Take Care"; 0.4-<0.5 "Healthy OK"; 0.5-0.6 Should "Consider Action"; > 0.6 Apple region (Person's Health is Probably at Risk).											
A: Dietary diversity score Less than 5 (254), **B: 5 and above (130)**.											

DISCUSSION

This study investigates the minimum dietary diversity of women of reproductive age. By examining food consumption patterns and factors influencing dietary choices, it aims to identify nutritional gaps. The findings will contribute to developing targeted interventions and policies to improve the nutritional well-being of this demographic.

The present study found that women of reproductive age had an average age of 30.14 years, with a standard deviation of 10.12. Around half of them were single, and over a third were aged between 20-29. Almost half of the women mentioned having families with 4-6 members. In terms of education, roughly one-third of the women held a secondary school education, while another third possessed a university degree. Employment-wise, over a third of the women worked in government sectors. Furthermore, almost half of the women reported earning low incomes. These demographic characteristics provide context for understanding women's dietary diversity in the study population. The finding that roughly half of the women in the present study were single underscores the importance of considering diverse demographics in nutritional research. This diversity suggests that single women may have different dietary needs and constraints than married women. Factors such as autonomy in food choices, financial limitations, and time management could influence the diets of single women, especially in developing countries. While promoting dietary diversity is crucial for well-being, it's essential to recognize the challenges posed by socioeconomic status. Education about nutrition is valuable, but access to nutritious foods is equally important for the success of such initiatives (Kolliesuah, et al.,2023).

It is important to emphasize that there were no significant differences in dietary diversity scores among women of reproductive age based on education levels. However, it is worth noting that a greater number of women with secondary and university education had a varied diet. These results contrast with studies conducted in Nouakchott, Mauritania (Issa, et al., 2024).

This aligns with an increasing amount of evidence demonstrating that education enhances nutritional results, particularly for females. Education may enable people to choose better foods by providing them with knowledge about healthy eating habits, access to resources, and the capacity to make educated selections.

Indeed, many citations highlight the multifaceted role of education in influencing dietary habits and nutritional outcomes among women. Education goes beyond the traditional classroom setting and can encompass various forms, including formal education, vocational training, and community-based initiatives. A study by Tamale, & Kagoro-Rugunda (2019) likely delves into the broader social and economic implications of education on health outcomes, emphasizing the interconnectedness of education, health, and overall well-being. Similarly, Komakech, et al., (2019) may explore how education empowers individuals to make informed choices regarding their diets and lifestyles. It's also noteworthy that while formal education is often emphasized, other factors such as practical skills training and community education programs can significantly impact dietary diversity and nutritional outcomes, as suggested by Gitagia, et al., (2019) and Chegere & Stage (2020).

The present study revealed a notable difference in dietary diversity among women, many of them had a low diversity score below 5, in contrast to those with a high score (≥5), averaging 4.11 ± 1.33, which was slightly below the 5-point threshold suggested by FAO (2021). This indicates that many

women surveyed faced limited food access, evident from their low diversity score. This finding bears some resemblance to the dietary diversity score of women of reproductive age in Nigeria (4.37) (Otekunrin, & Otekunrin, (2021), lower than that of women in Nouakchott, Mauritania (5.48) (Issa, et al., 2024), but surpasses that of women in Tanzania (3 scores) (Bellows, et al., 2020). Despite some studies focusing on fewer food groups, a consistent pattern of low dietary diversity among women of reproductive age emerges. This trend was also observed among women of reproductive age in Senegal (Tine, et al., 2018), Mali (Adubra, et al., 2019), and Burkina Faso (Custodio, et al., 2020).

It's distressing to note that despite the variations in dietary diversity scores across these areas, a consistent trend of low diversity persists, indicating a broader systemic problem. The factors contributing to this trend, such as economic constraints, limited access to nutritious foods, and reliance on cheaper, processed alternatives, paint a complex picture of food insecurity and its impact on women's health and well-being.

The present findings indicate that cereal and starchy staples are prominent in women's diets, which is similar to studies conducted among women of reproductive age in Ethiopia (Merga, et al., 2022) and Nouakchott, Mauritania (Issa, et al.,2024), and higher than consumption of women in western Sudan (Musa, & Nimar, 2022). Conversely, in Sana'a Governorate, women tend to have a diverse food intake, incorporating items like oil, sugar, honey, and dairy (Masood, & Al Mansoob, 2021). These differences in dietary patterns can be attributed to various factors such as agricultural practices, cultural preferences, food availability, and accessibility.

The emphasis on incorporating pulses into the diet is indeed well-founded. While they offer valuable nutrients like protein and B vitamins, their amino acid profile may be incomplete. Pairing them with other foods, like grains, can complement this deficiency, ensuring a more balanced intake of essential amino acids (FAO, 2021).

Culinary cultures vary considerably around the globe. Yemeni cuisine is based mostly on beans, which are consumed throughout the day and usually in combination with other foods. This method enhances the range and richness of nutrients in the diet.

Due to their versatility in the kitchen, pulses add value to any dish. In addition to providing a consistent source of energy, pulses are a terrific way to add taste and nutrition to cuisine. They are delicious in salads, stews, and thick soups. People's ease of inclusion into daily meals is promoted by their flexibility, which leads to better health outcomes.

The present study found that women in the surveyed district are shifting away from red meat consumption towards white meat options like chicken and fish. This pattern mirrors findings from similar studies conducted in western Sudan (Musa, & Nimar, 2022) and the Sanaa governorate (Masood, & Al Mansoob, 2021). One of the possible reasons for this shift could be the higher cost of red meat relative to white meat. This dietary shift is likely also influenced by the accessibility of white meat options in the community. Furthermore, the purported health benefits of white meat may also have a role in women's decision making. Due to their reputation as leaner protein sources, those who are concerned about their nutritional health may find fish and chicken more enticing than red meat. The availability of a range of cooking methods and recipes could potentially increase the appeal of white meat dishes among women in the governorate. Together, these factors impact women's food

choices, highlighting the importance of cultural, economic, and health-related factors when it comes to eating.

The finding that about one-quarter of the women in the current research consumed eggs as a part of their diet demonstrates the popularity of eggs as a food option among women, surpassing the findings from the study conducted in Nouakchott, Mauritania (Issa, et al., 2024). This suggests that the nutritional value of eggs is highly valued by these women, outweighing the financial burden. The consumption of eggs may also represent a cultural or traditional dietary preference that holds significant importance in their daily lives. Eggs are versatile and provide a range of valuable nutrients that contribute to overall health and well-being (FAO,2021). Despite their high cost, many people—especially working women who have to balance job, family, and other responsibilities—find them to be a reasonable alternative because they are simple to prepare.

Two-thirds of the women in this area consumed milk and other dairy products despite their high cost. It is interesting to note that drinking tea with milk is a common practice in Yemen and is known as "shahi bil haleeb". The tea is typically a strong black tea brewed with cardamom and other spices, then mixed with hot milk and sugar. It is often served in small glasses and is a popular beverage for social gatherings and hospitality. Dairy products are renowned for their nutritional value, being rich sources of high-quality protein, potassium, calcium, and vitamin B12. This underscores their importance in maintaining a balanced diet and meeting essential nutrient requirements. It's intriguing how the study highlights the underutilization of surveyed women of seeds, nuts, and certain fruits and vegetables rich in vitamin A in particular. This pattern suggests a potential gap in nutritional awareness or access to diverse food options within this demographic. Promoting the consumption of these foods could be pivotal in addressing potential deficiencies and fostering better health outcomes. Additionally, emphasizing the benefits of incorporating dark green leafy vegetables, rich in vitamin A, folate, and minerals, could help bridge this gap and encourage a more balanced diet among women. Such insights are invaluable for crafting targeted interventions to promote better nutritional habits and overall wellness (FAO, 2021).

Once again, the influence of seasonality on women's dietary diversity and food preferences might have been significant, though the cross-sectional nature of the data precluded consideration of seasonal fluctuations. Nevertheless, it's worth noting that the consumption of vegetables or fruits could also be impacted by seasonal changes (Custodio et al., 2020).

In this study, it was observed that slightly less than half of women of reproductive age consumed a notable quantity of vegetables other than dark green leafy vegetables or other vitamin A-rich options. It's noteworthy that this finding contrasts with a previous study conducted in Sudan, where only 27% of women of reproductive age reported consuming other vegetables (Musa, & Nimar, 2022).

The minimum dietary diversity score of women at reproductive age in this study was shown to be significantly associated with family size (P-values 0.02). However, the relationship between family size with dietary diversity is consistent with the study conducted in Woldia northeast Ethiopia (Endalifer, et al.,2021). It is a conceivable reality that as the number of family members increases, it becomes more difficult for them to provide adequate and diverse food to meet everyone's needs. living with families of more than five were 1.8 times more expected to have insufficient dietary diversity (Zewdie, et al., 2021).

In the present study, the mean BMI of women at reproductive age was 24.35 kg/m² (SD±5.21), with a waist circumference of 80.96 cm (SD±13.24) and a mean waist-to-height ratio of 0.51 (SD±0.08). The current results emphasized the diverse distribution of anthropometric measurements among women across different age brackets. No significant association was found between minimum dietary diversity score and BMI or waist-to-height ratio. However, a notable association was observed between minimum dietary diversity and waist circumference, with a P-value of 0.03. This finding suggests that while overall dietary diversity may not directly impact BMI or waist-to-height ratio, it could potentially influence waist circumference. Exploring the underlying mechanisms that may explain this association could offer valuable insights into the role of dietary diversity in maintaining a healthy weight and reducing the risk of related health issues (Golpour-Hamedani, et al., 2020).

In general, women can make informed dietary choices and ensure they are getting the essential nutrients they need to maintain excellent health by using the MDD-W as a helpful tool. The aim of the MDD-W is women's overall health; it promotes a diverse and well-balanced diet.

CONCLUSION

Based on the findings of the current study, we conclude that approximately one-third of women of reproductive age consumed five or more diverse food groups. Roughly two-thirds of the women in the study consumed milk and dairy products. The stable food items consumed by the women were cereals and starchy foods. Half of the women of reproductive age consumed pulses and related products. Despite the high cost of eggs, more than half of the women in the study opted to include them in their diets. This underscores the significance women place on the nutritional value of eggs, even in the face of financial constraints. The women studied had notably lower consumption of red meat compared to white meat (fish and chicken). Women in the present study consumed more other vegetables than dark green leafy or vitamin A-rich vegetables. A significant association between dietary diversity score and women’s family members was observed, also, a significant association was also observed between the dietary diversity score and women’s waist circumference.

Recommendation

1- **Importance of Balanced Diet:** Emphasize the significance of promoting diverse and balanced diets to enhance the health and well-being of women of reproductive age.
2- **Nutrition-sensitive Agriculture:** Suggest integrating a nutrition-sensitive approach into agricultural interventions to ensure food diversity for vulnerable women.
3- **Managing Food Costs:** Highlight the necessity of strategies to mitigate the high cost of food, enabling households to afford nutritious diets for all family members.
4- **Variety in Women's Diets:** Recommend women consume a variety of foods to maintain a balanced diet and fulfill nutritional requirements.
5- **Family Size Impact:** Recognize the influence of family size on diet diversity, advocating for tailored interventions to meet the unique needs of households of different sizes.
6- **Longitudinal Studies:** Advocate for longitudinal studies to comprehend changes in dietary patterns over time, considering seasonal variations to inform targeted interventions.
7- **Identifying Nutrient Gaps:** Suggest further research to identify nutrient deficiencies among women and promote the consumption of neglected food groups to enhance diversity.

8- **Dietary Diversity and Health Outcomes**: Call for research into the relationship between dietary diversity and waist circumference, aiming to understand its implications for overall health.

Holistic Approach to Education and Health

Using comprehensive interventions that include both formal and informal learning is essential given the substantial association that has been found between food choices and educational opportunities. By recognizing the wide-ranging effects of counseling and education on people's nutritional state, these approaches pave the way for more effective medical interventions.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript

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