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FRUITS AND VEGETABLES CONSUMPTION AND ASSOCIATED FACTORS AMONG WOMEN OF REPRODUCTIVE AGE IN THE TAMALE METROPOLIS OF GHANA

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ABSTRACT

Fruits and vegetables serve as major sources of micronutrient, and it is critical for development and growth through the life course. There is a paucity of information on fruits and vegetables intake among women of reproductive age in the Tamale Metropolis. The study assessed fruits and vegetable consumption and associated factors among women of reproductive age in Tamale Metropolis of Ghana. This research is an analytical cross-sectional study and involved 327 women of reproductive age selected through systematic random sampling from the Tamale Metropolis. Socio-demographic characteristics, dietary intake, and anthropometry were documented using a semistructured questionnaire. A 24-hour dietary recall method was used to assess fruits and vegetables intake, and evaluated based on Ghana's Food-Based Dietary Guidelines. Descriptive statistics and chi-square test were performed. The mean (sd) age of the participants was 24.3±5.3 years. About 32% and 48% of the participants consumed fruits and vegetables, respectively. Regarding variety, 92% and 93.3% of participants had low fruits and low vegetable intake, respectively. The most consumed fruits were bananas (13.5%), mango (8.0%), orange (5.2%), and apple (4.9%), while the most consumed vegetables were tomato (34.3%), onion (30.6%), and pepper (25.1%). The educational status (X^2 =67, p=0.035), marital status (X^2 =5.9, p=0.022) and income status (X^2 =6.5 p=0.024) were significantly associated with fruit intake. Vegetable intake had significant association (X^2=4.9, p=0.036) with central obesity. There was low intake of fruits and vegetables among women in the Metropolis. The level of education, marital, and income of participants influenced fruits intake.

Keywords: *Fruits, Vegetables, Women of Reproductive Age, Micronutrient, Food-Based Dietary Guidelines*

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1.0 INTRODUCTION

Women of reproductive age (15-49 years) are classified as having high physiological needs (FAO, 2021; FAO, 2016). The nutrition of this group is important because their nutritional status affects the epigenesis of revamping foetus genes, neonates, neurodevelopment, birth outcomes, and the future of the child (Stephenson et al., 2018; King, 2016; Nnam, 2015). To meet their nutritional needs, women of reproductive age are encouraged to eat from all food groups, especially the nutrient-rich (Andrews et al., 2022). Due to this, the diet for this group should be persistently adequate in fruits and vegetables to meet the micronutrient needs (Lecorguillé et al., 2022).

The intake of fruits and vegetables helps to reduce and prevent cardiovascular diseases and their related risk factors (Kaur and Aeri, 2019). Fruit intake alone reduces the risk of colon cancer, depression and pancreatic disorders, and vegetable consumption is found to ameliorate cancers of the colon and rectal, hip fracture, cerebrovascular accident, psychological distress and pancreatic ailments (Głąbska et al., 2020; Angelino et al., 2019; Appleton et al., 2016). The consumption of fruits and vegetables increases vitamin C, folate, carotenoids (alpha and beta) and lutein (Duthie et al., 2018). Higher intake of vegetables and in variety helped to improve the health related quality of life among women of reproductive age (Azupogo et al., 2018). Despite, the vitamins, minerals, fibre and phytochemicals benefits from fruits and vegetables, a review showed that there was limited intake of fruits and vegetables in developing countries (Pem & Jeewon, 2015).

A number of studies have reported poor dietary intake, malnutrition, and anaemia among women of reproductive age (Andrews et al., 2022; Bhandari et al., 2016; Habibi et al., 2021; Becker et al., 2016; Kehoe et al., 2019; Okechukwu et al., 2018; Khanam et al., 2018). Poor dietary intake, including poor intake of fruits and vegetables, is associated with deficiency of micronutrients such as vitamin D, folate, and iron among women of childbearing age (Becker et al., 2016). Low fruit and vegetable intake has been linked to anaemia (Ghose and Yaya, 2018) and increased occurrence of metabolic syndrome (Papaioannou et al., 2022). In a nationally representative study, nutrient gaps in iron, folate, zinc, calcium, magnesium, and vitamins A, E, B_6, B_{12}, C, and K were prevalent among women in fertile age in the United States of America (Murphy et al., 2022; Devarshi et al., 2021). Suboptimal intake of vitamin A, iron, iodine, folate, and zinc, and high prevalence of anaemia in the preconception period have been reported in some developing countries such as Ethiopia, Nigeria, Kenya and South Africa (Harika et al., 2017). These multiple micronutrient shortfalls and anaemia are particularly rampant among women of low socioeconomic status (Ghose and Yaya, 2018; Hasan et al., 2022).

Although women of childbearing age demonstrate good knowledge and attitudes towards fruits and vegetable consumption, they practice otherwise (Sarfo et al., 2023). A study in India reported an irregularly intake of fruits and vegetables among women in fertile age and cited several modifiable factors as impediments to consumption (Kehoe et al., 2019). Barriers identified to precipitate inadequate consumption of fruits and vegetables in the preconception period are not limited to personal factors, household dynamics, education, income level, marital status, social and cultural norms, workload, time pressures, taste, inconvenience, environmental factors and cost (Abraham et al., 2024; Kehoe et al., 2019; Stadlmayr et al., 2023; Campbell et al., 2014; Küçük et al., 2023; Duthie et al., 2018; Appleton et al., 2016).

Several studies have been carried out in Ghana to ascertain consumption of fruits and vegetables using the World Health Organization recommendations (Okyere et al., 2024; Tachi et al., 2020; Ghose and Yaya, 2018; Amo-Adjei and Kumi-kyereme, 2015). While majority indicated low consumption of fruits and vegetables among the study population (Ghose and Yaya, 2018; Amo-Adjei and Kumi-kyereme, 2015), one showed adequate intake of fruits and vegetables (Tachi et al., 2020). In addition, all the aforementioned studies were silent about the varieties of fruits and vegetables consumed by the participants. Recently, Ghana developed food-based dietary guidelines (FBDGs) which provide information about nutrition and health backed by scientific evidence for healthy persons

aged five years and above (Ministry of Food and Agriculture, 2024). The guidelines categorized food in Ghana into six groups, and prominent among them are fruits and vegetables that are locally available. Adherence to these national dietary guidelines on fruits and vegetables among women of reproductive age in Ghana is not ascertained. This study is first to give insight into fruits and vegetables intake based on Ghana's FBDGs and the precursors to their consumption among women in fertile age. This study sought to assess the consumption of fruits and vegetables and associated factors among women in reproductive age in the Tamale Metropolis of Ghana.

2.0 MATERIALS AND METHODS

2.1 Study area, design and participants

This analytical cross-sectional study was conducted in the Tamale Metropolis of Northern Region of Ghana. Tamale is the capital of the Northern Region and it is located in the middle of the Region at latitude 9.403423 and longitude -0.842416. Tamale shares borders with Sagnarigu District to the West and North, Mion District to the East, East Gonja to the South, and Central Gonja to the South-West. The Metropolis is approximately 180 metres above sea level and it has one rainfall season in the year. The overall female population in the Metropolis is 189,693. Most the people living in the Metropolis are Dagombas, with few being Akans, Gonjas, Mamprusis, Dagaabas and Ewes. Generally, the population engages in sales and services, with few also into craft work, agriculture, forestry and fishery work (Ghana Statistical Service, 2021).

Cochran's formula was used to calculate the sample size of 327 with a 15% dropout rate inclusive. A systematic random sampling was used to select 327 women of childbearing age in the Metropolis. The recruitment of participants started in 17 June, 2023 and ended in 8 July, 2023. The data was collected with the aid of research assistants.

Inclusion and exclusion criteria

Women aged 15-45 years without any known medical condition or on special diet and who consented to participate in the study were included. Women aged 15-45 years who were either lactating or pregnant or had any known disease or were on medication or special diets were exempted from the study.

2.2 Data collection

A pretested semi-structured questionnaire was used to collect participants' information on socio-demographic characteristics (age, marital status, educational status, income level, etc.) and dietary intake (fruits and vegetable consumption) and anthropometry.

2.2.1 Income level

The income level was categorized based on the minimum daily wage in Ghana as of January 2024. The daily minimum daily wage was GHC18.15. Participants earning less than or equal to GHC545 and between GHC546 to GHC2,000 were classified as low and moderate income status, respectively.

2.2.2 Dietary intake

The fruits and vegetables intake of participants on the previous day was collected with the aid of 24-hour recall. A single 24-hour recall was used to collect information about the time, types and quantities of fruits and vegetables consumed in the previous day. Participants used food models or handy measures to estimate the quantity of fruits and vegetables consumed. The amount of fruit(s) or vegetable(s) eaten by each participant was compared with the recommendations by the Food-Based Dietary Guidelines (Ministry of Food and Agriculture, 2023). Each component of the fruits and vegetables that met the recommendations by the FBDGs was scored one (1) meaning adequate and those that did not meet the recommendation, including the ones that were not consumed were scored zero (0) meaning inadequate.

Additional analysis was done to indicate high or low intake variety based on the list of fruits and vegetables assessed. The fruit list had twelve items, a participant consuming greater than or equal to two (≥2) of the items was considered to have a high intake and low when the intake was less than or equal to one (≤1). The vegetables had 11 food items, the intake of five and above (≥5) was indicated high, and four and below (≤4) was low intake. These categorizations were based on the variety recommendations by the FBDGs in Ghana.

2.3 Anthropometry

The weight of participants was measured twice on barefoot and in light clothing, and the average was calculated. The unit of measurement was in kilograms (kg). The height of participants was measured twice on barefoot and the average was determined. The height was measured in meters (m). The averages of weight and height were used to determine the body mass index (BMI). The BMI was calculated based on weight (kg) divided by height (in meters squared (m^2)). The BMI unit was kg/m^2. The BMI was classified into underweight (less than 18 kg/m^2), normal (18-24.9kg/m^2), overweight (25-29.9kg/m^2) and obese (greater or equal to 30kg/m^2) based on the cut off by World Health Organization (World Health Organization, 2010).

The waist circumference and hip circumference were determined with a measuring tape in inches. The waist circumference was measured by placing the tape measure in between the bottom of the ribs and on top of the hip bone, in line with the belly button. The readings were recorded when the participants exhaled. As a precaution, participants stood up straight and the tape wrapped was not too tight. The hip circumference was measured at the widest part of the buttock. Measurement was done at a level parallel to the floor. The measurement procedure was adhered to as recommended by World Health Organization. The waist-to-hip ratio (WHR) tabulated was defined as normal (≤0.85) and high (≥0.86) (World Health Organization, 1999).

2.4 Statistical analysis

The Statistical Package for Social Sciences (SPSS version 25) was used for the data analysis. Data were presented in mean, standard deviation, frequency, and percentages. Bar charts were used in the graphical presentation of the proportions of fruits and vegetables consumed in the previous 24 hours. Descriptive statistics were used to analyse the sociodemographic characteristics, anthropometric parameters, fruits, and vegetable consumption. The Chi-square test was used to analyse the association between sociodemographic characteristics, anthropometric indicators, fruits, and vegetables intake. All p values were significant at $p<0.05$.

2.5 Ethics statement

The Institutional Review Board of the University for Development Studies (UDS/RB/056/23), Tamale, Ghana, reviewed and approved the study protocol. The purpose and benefits of the study were explained to the participants in the language they understood and were assured of confidentiality. Participants who agreed and signed or thumb-printed on the informed consent qualified to participate in the study.

3.0 RESULTS

3.1 Socio-demographic characteristics and anthropometric indices

The socio-demographic characteristics and anthropometric indices of participants are presented in Table 1. A total of 327 participants were included in the study with a mean age of 24.3±5.3. About 64% had tertiary education and 13.5% had no formal education. The majority (68.5%) of the participants were students. The income status of the majority (77.7%) was low. Approximately, 80% were unmarried and 20% were married. The mean body mass index was 30.5±14.0, with obesity (32.7%), overweight (32.4%), and underweight (4.6%). Participants with a high waist-to-hip ratio was

35.5%.

Table 1: Sociodemographic characteristics and anthropometric indices (revised)

Characteristics	**M±sd**	**N(%)**
Age	24.3±5.3	
Weight (kg)	64.1±12.8	
Height (m)	1.5±0.2	
BMI (kg/m^2)	30.5±14.0	
Educational status		
Pre-tertiary		75(22.9)
Tertiary		208(63.6)
No-formal education		44(13.5)
Marital status		
Married		66(20.2)
Single/Separated/Widowed		261(79.8)
Occupation		
Student		224(68.5)
Trader		33(10.1)
Others		70(21.4)
Income status		
Low (≤Ghc545)		254(77.7)
Moderate (Ghc546-2,000)		73(22.3)
BMI status		
Underweight		15(4.6)
Normal		99(30.3)
Overweight		106(32.4)
Obese		107(32.7)
Abdominal Obesity		
Normal		211(64.5)
High		116(35.5)

Frequency(percentage), Mean (M), Standard deviation (sd), Others (seamstress, teachers, housewife, blacksmith, auditor, dispensary technician, housewife, unemployed)

3.2 Proportion of fruits consumed in the previous 24 hours.

The proportion of participants consuming fruits in the previous 24 hours is represented in Figure 1. The fruits mostly consumed were bananas (13.5%), mango (8.0%), orange (5.2%), and apple (4.9%). Few participants consumed avocado (2.1%), pineapple (1.2%), dates (0.6%), grapefruit (0.6%), tangerine (0.3%) and blackberries (0.3%).

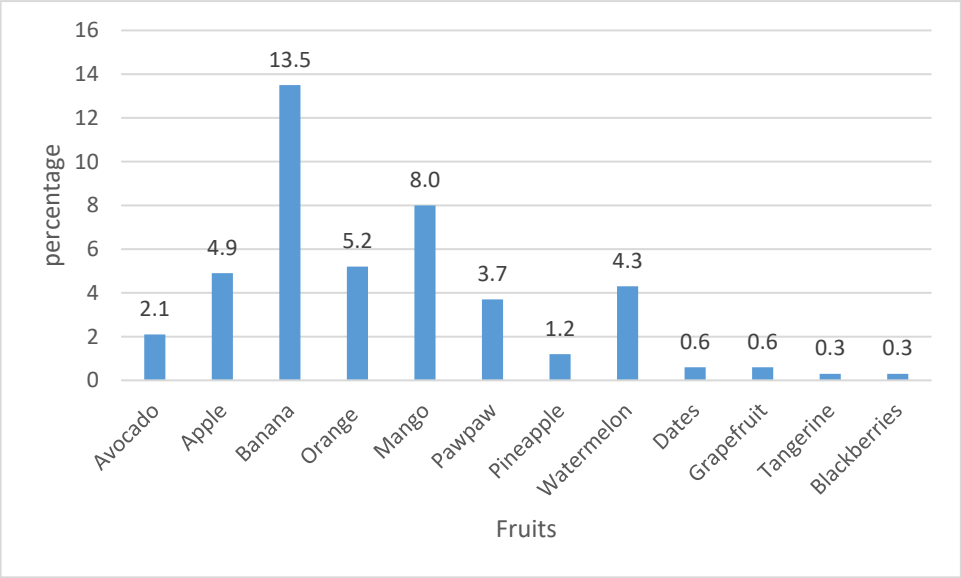

Figure 1: Proportion of fruits consumed in the previous 24 hours.

3.3 Proportion of vegetables consumed in the previous 24 hours

The vegetables most consumed the day before the data collection were tomato (34.3%), onion (30.6%) and pepper (25.1%). Few participants consumed okra (6.4%), cucumber (6.4%), lettuce (4.6%), eggplant (0.9%), cocoyam leaves (0.9%) and spinach (0.6%) (Figure 2).

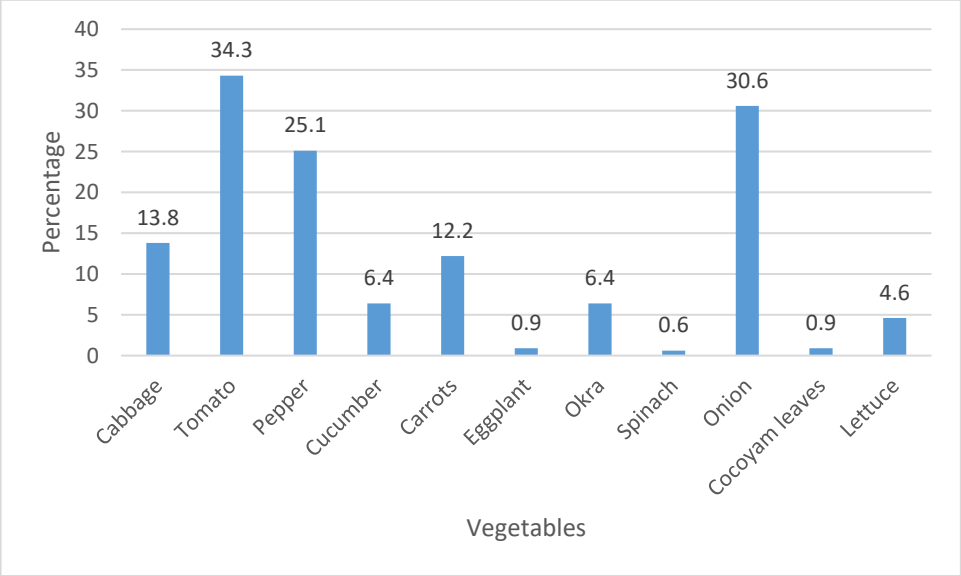

Figure 2: Proportion of vegetables consumed in the previous 24 hours

3.4 Fruits and vegetables consumption status

Nine in ten participants had inadequate intake of avocado (97.9%), apple (94.2%), oranges (95.1%), mango (92.0%), pawpaw (96.3%), pineapple (98.8%), watermelon (95.7%), dates (99.4%), grapefruit (99.4%), tangerine (99.7%) and blackberries (99.7%). Likewise, nine in ten showed inadequate consumption of cucumber (93.6%), eggplant (99.1%), okra (93.6%), spinach (99.4%), lettuce (95.4%) and cocoyam leaves (99.1%) (Table 2).

Table 2: Fruits and vegetable consumption status

Fruits	Status Adequate N(%)	Inadequate N(%)	Vegetables	Status Adequate N(%)	Inadequate N(%)
Avocado	7(2.1)	320(97.9)	Cabbage	45(13.8)	282(86.2)
Apple	19(5.8)	308(94.2)	Tomato	112(34.3)	215(65.7)
Banana	44(13.5)	283(86.5)	Pepper	82(25.1)	245(74.9)
Orange	16(4.9)	311(95.1)	Cucumber	21(6.4)	306(93.6)
Mango	26(8.0)	301(92.0)	Carrots	39(11.9)	288(88.1)
Pawpaw	12(3.7)	315(96.3)	Eggplant	3(0.9)	324(99.1)
Pineapple	4(1.2)	323(98.8)	Okra	21(6.4)	306(93.6)
Watermelon	14(4.3)	313(95.7)	Spinach	2(0.6)	325(99.4)
Dates	2(0.6)	325(99.4)	Onion	100(30.6)	227(69.4)
Grapefruit	2(0.6)	325(99.4)	Cocoyam leaves	3(0.9)	324(99.1)
Tangerine	1(0.3)	326(99.7)	Lettuce	15(4.6)	312(95.4)
Blackberries	1(0.3)	326(99.7)			

Frequency(percentage)

3.5 Proportions and varieties of fruits and vegetable consumption

The proportions and varieties of fruits and vegetables consumed are shown in Table 3. The results showed that 67.9% did not eat fruit the previous day and 92% were in the low fruit intake category. Similarly, 52% did not consume vegetables and 93.3% were in the low vegetable intake status.

Table 3: Proportions and varieties of fruits and vegetables consumed

Variables	Frequency (Percentage)
Fruit intake	
Yes	105(32.1)
No	222(67.9)
Fruit intake status	
Low	301(92.0)
High	26(8.0)
Vegetables intake	
Yes	157(48.0)
No	170(52.0)
Vegetables intake status	
Low	305(93.3)
High	22(6.7)

Fruits: low (≤1), high (≥2); Vegetables: low (≤4), high (≥5)

3.6 Association between sociodemographic fruits and vegetable consumption

The participants showed low intake of fruits, and it was more prevalent among those pre-tertiary education level (97.3%), unmarried (93.8%), students (92.9%), and low income (94.1). A statistically significant association existed between educational status (X^2=6.7, p=0.035), marital status (X^2=5.9, p=0.022), income status (X^2=6.5, p=0.024) and fruit intake status (Table 4).

The consumption of vegetables were predominantly low with participants having no formal education (97.7%), singles (93.5%), others (94.3%), and low income (93.7%). None of these factors had a significant association with vegetable intake (Table 4).

Table 4: Association between sociodemographic fruits and vegetable consumption

Variables	Fruits intake status Low	High	X^2	p-value	Vegetables intake status Low	High	X^2	p-value
Educational status								
Pre-tertiary	73(97.3)	2(2.7)	6.7	0.035	71(94.7)	4(5.3)	2.3	0.314
Tertiary	191(91.8)	17(8.2)			191(91.8)	17(8.2)		
No-formal education	37(84.1)	7(15.9)			43(97.7)	1(2.3)		
Marital status								
Married	56(84.8)	10(15.2)	5.9	0.022	61(92.4)	5(7.6)	0.1	0.784
Single/Separated/Widowed	245(93.8)	16(6.2)			244(93.5)	17(6.5)		
Occupation								
Student	208(92.9)	16(7.1)	1.0	0.600	211(94.2)	13(5.8)	4.2	0.125
Trader	29(87.9)	4(12.1)			28(84.8)	5(15.2)		
Others	64(91.4)	6(8.6)			66(94.3)	4(5.7)		
Income status								
Low	239(94.1)	15(5.9)	6.5	0.024	238(93.7)	16(6.3)	0.3	0.597
Moderate	62(84.9)	11(15.1)			67(91.8)	6(8.2)		

Frequency (N), percentage (%), Chi-square (X^2), Fisher's exact test, $p<0.05$, Others (seamstress, teachers, housewife, blacksmith, auditor, dispensary technician, housewife, unemploye)

3.7 Association between anthropometric indicators, fruits and vegetable consumption

The Chi-square showed that fruits intake was not significantly associated with the anthropometric status of participants. Majority of the participants with high vegetable intake were obese (45.5%), however had a normal abdominal obesity (86.4%). The consumption of vegetables was significantly associated central obesity ($X^2=4.9$, $p=0.036$) (Table 5).

Table 5: Association between anthropometric indices, fruits and vegetable consumption

Variables	Fruits intake status Low	High	X^2	p-value	Vegetables intake status Low	High	X^2	p-value
BMI status								
Underweight	14(4.6)	1(3.8)	7.2	0.066	13(4.3)	2(9.0)	3.5	0.315
Normal	96(31.9)	3(11.5)			95(31.1)	4(18.2)		
Overweight	98(32.6)	8(30.8)			100(32.8)	6(27.3)		
Obese	93(30.9)	14(53.9)			97(31.8)	10(45.5)		
Abdominal Obesity								
Normal	197(65.4)	14(53.8)	1.4	0.286	192(63.0)	19(86.4)	4.9	0.036
High	104(34.6)	12(46.2)			113(37.0)	3(13.6)		

Frequency (N), percentage (%), Chi-square (X^2), Fisher's exact test, $p<0.05$

4.0 DISCUSSION AND IMPLICATIONS

4.1 Discussion

Fruits and vegetables are important components of the human diet as they contain essential vitamins, minerals and phytochemicals critical for growth and development. The study evaluated fruits and vegetables intake and associated factors among women of reproductive age in the Tamale Metropolis of Ghana.

The present study indicated low proportions of fruits and vegetable consumption, and this may be attributed to the seasonality or availability, insufficient storage and processing technologies, cost of fruits and vegetables and the low-income levels of the majority of the participants. Seasonal difference significantly influenced the consumption of fruits and vegetables among women in East Africa (Sarfo et al., 2023). Cost and income levels have been indicated to influence the consumption of fruits and vegetables in many countries across the globe with varied income status (Miller et al. 2016). This outcome is similar to that reported among women in fertile age who showed irregular consumption of fruits and vegetables due to cost in India (Kehoe et al., 2019). The current finding is similar to other studies conducted in Ghana however the previous researches evaluated fruits and vegetables intake of the participants based on the World Health Organization recommendations (Ghose and Yaya, 2018; Amo-Adjei and Kumi-kyereme, 2015). Although fruits and vegetables intake were low however bananas, mangoes, oranges, tomatoes and onions were the most consumed. This outcome was similar to another study conducted in the Volta region of Ghana (FM et al., 2015).

The results further revealed high prevalence of inadequate, and low varieties of both fruits and vegetable consumption. The seasonality or availability, insufficient storage and processing technologies of fruits and vegetables and low-income status of the majority of the participants could have accounted for this outcome. Similar outcomes have been reported in India and Nepal among women of childbearing age who also showed low variety of fruits and vegetables intake (Kehoe et al., 2019; Campbell et al., 2014). The present findings is also consistent with a study among adult that compared consumption of fruits and vegetables using the United States of America Dietary Guidelines recommendations (Wagner et al., 2016). Another study that compared fruits and vegetables intake to the World Health Organization fruits and vegetable consumption recommendations also reported low intake among women of reproductive age (Ghose and Yaya, 2018). Low consumption of fruits and vegetables has also been demonstrated in women of fertile age in East Africa (Sarfo et al., 2023).

The study revealed a significant association between fruit consumption and education, marital status, and income level. This findings is analogous to another research in Ghana that showed that educational level, marital status and income level influence the consumption of fruits and vegetables (Abraham et al., 2024). The outcome also is consistent with a study from Nepal that indicated that women of low socioeconomic status had rare consumption of fruits and vegetables (Campbell et al., 2014). The factors identified in this study to have influenced fruits and vegetables intake were similar to those reported in a national survey in Turkey (Küçük et al., 2023).

The current study also revealed a high prevalence of obesity, overweight, and central obesity. This outcome is consistent with another study in Indonesia among women in fertile age that indicated high rates of overweight and obesity (Kusumawardani and Kumorowulan, 2021). The high prevalence of overnutrition could be attributed to the low proportions, low varieties, and high inadequate consumption of fruits and vegetables. Anti-excessive fat agents are contained in the phytochemicals in fruits and vegetables (Pem and Jeewon, 2015). Inadequate consumption of fruits and vegetables has been associated with high prevalence of metabolic syndrome in adults (Papaioannou et al., 2022). These fruits and vegetables contain micronutrients such as vitamins B_1 and B_2 and other trace elements needed for the metabolism of carbohydrates, fat, and protein. Deficiency of these nutrients leads to poor appetite control, energy, leptin and ghrelin metabolism (Astrup and Bügel, 2010). Obesity has been implicated in micronutrient deficiencies such as zinc, manganese, magnesium, copper, chromium, vanadium, thiamine, folate, ascorbic acid, and vitamin D amongst others due to reduced nutrient intake and changes in nutrient kinetics (Lapik et al., 2020; Sánchez et al., 2016; de Luis et al., 2013; Asfaw, 2007). It appears there is a vicious cycle between micronutrient deficiency and obesity. Poor nutritional status reported among women of reproductive age in Nepal was linked to poor intake of fruits, vegetables, meat and meat products (Bhandari et al., 2016).

The findings showed that vegetable intake had a significant association with central obesity. The participants with normal central obesity had a high intake of vegetables. The fibre content of vegetables may have reduced the intake of other high-calorie foods and reduced belly fat. Adequate fibre intake is protective against obesity by increasing satiety hormones such as cholecystokinin and glucagon-like-peptide-1 and maintaining healthy gut microbiome (Waddell and orfila, 2023; Kobylińska et al., 2022). In addition, the consumption of this nutrient-rich food may mean to meeting the recommended dietary allowance for the critical micronutrient such as vitamin D, vitmain E, thiamine and vitamin C suspected to aid the prevention of excessive fat accumulation (Kobylińska et al., 2022; Duthie et al., 2018). This outcome is contrary to another study that found no significant association between nutritional status and vegetable consumption among women of childbearing age in Indonesia (Kusumawardani and Kumorowulan, 2021).

4.2 Policy implications

The study found low consumption of fruits and vegetables in terms of proportions and varieties based on Food-Based Dietary Guidelines in Ghana among women of reproductive age. The consequences of this is evidenced by the presence of high levels of overweight, general obesity, central obesity and low income earners. Implying that without any policy intervention to improve the consumption of fruits and vegetables in this age categories they would be denied of beneficial micronutrient that support pregnancy, health, mental and general well-being. In the long term, it will negatively influence productivity, economy, increase health care bills and reduce lifespan.

4.3 Strength and Limitations

The study provides information about fruits and vegetable consumption based on the Food-Based Dietary Guidelines in Ghana and the nutritional status of women of reproductive age. The research elaborates on sociodemographic and economic factors that influence fruits and vegetables intake among the non-pregnant and non-lactating mothers in the reproductive age. It further gives insight into the association between fruits and vegetable consumption on nutritional status of women in fertile age. As a limitation of this study, the dietary recall method depended on memory, and this could have led to either underestimation or overestimation of fruits and vegetables consumed.

5.0 CONCLUSION

There was a high prevalence of low proportions, low varieties, and inadequate intake of fruits and vegetables based on the Ghana's Food-Based Dietary Guidelines. Education, marital, and income status were significantly associated with fruits intake, and normal central obesity had significant association with high vegetable intake. Organizations interested in nutrition, health and economic wellbeing of women of reproductive age should provide interventions geared towards economic empowerment as it has the potential to increase their accessibility to fruits and vegetable to boost consumption. The Ministry of Food and Agriculture should enact legislation and support policies that promotes commercial fruits and vegetables cultivation to increase availability. The Ministry of Trade and Industry and Ministry of Food and Agriculture should team up to provide storage and processing facilities to preservation of fruits and vegetables to sustain available throughout the year. Based on the outcome of this study, researchers and non-governmental organizations are encouraged to implement nutrition sensitive and specific agriculture intervention programmes and projects among this age group and in the Metropolis. The media, health professionals, researchers, and nutrition educators should sensitize and educate women of reproductive age to the benefits of consuming adequate fruits and vegetables based on the standards of the Food-Based Dietary Guidelines in Ghana.

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Authors declare no conflict of interest

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Data availability statement
Upon reasonable request, data for this study can be made available by writing to the Chairman, Committee on Human Research Publication Ethics, and ethics review board of University for Development Studies, P. O. Box TL 1350, Tamale, Ghana

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