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FACTORS AFFECTING FAT AND FIBRE CONSUMPTION OF GHANAIAN PREGNANT WOMEN: FINDINGS FROM A HOSPITAL-BASED STUDY

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ABSTRACT: Dietary behaviours are key modifiable factors that can significantly affect pregnancy outcome. An understanding of these behaviours, including their variability according to socio-economic status and cultural diversities, could guide the development of effective nutritional policies and programmes for pregnant women in Ghana amidst the growing burden of non-communicable disease (NCDs). This hospital-based study assessed pregnant women's fat and fiber consumption and factors affecting this behaviour. The study employed a descriptive cross-sectional design and quantitative approach. Two hundred (200) pregnant women were recruited from the antenatal care (ANC) unit of the Presbyterian Hospital in Dormaa Ahenkro, Ghana, using convenience sampling technique. The Fat and Fibre Behaviour Questionnaire (FFBQ) was used to collect data for the study. The instrument was interviewer-administered. Statistical Package for Social Sciences (SPSS) version 25 was used to analyze the data. Overall, fat, fibre, and total index were 2.65 (± 0.49), 2.82 (± 0.78), and 2.71 (± 0.38), respectively. Factors significantly affecting fibre index were age ($H(4) = 28.21$, $p < .001$), educational status ($H(4) = 28.30$, $p = .001$), marital status ($H(2) = 13.49$, $p = .001$), ethnicity ($H(3) = 23.92$, $p < .01$), and community of residence ($U(N_{urban} = 61, N_{rural} = 139) = 5097.00$, $p = .022$). Only educational status ($H(4) = 10.17$, $p = .038$) and ethnicity ($H(3) = 24.77$, $p = .001$) significantly affected fat index. The findings highlight the need to scale-up public health programmes and research in Dormaa Central Municipality, particularly on maternal nutrition and related issues.

Keywords: Fat, Fibre, Consumption, Ghanaian, Pregnant Woman

1. INTRODUCTION

The quality of pregnant women's diet plays a critical role in their overall health status and outcome of the pregnancy (Masoumi *et al.*, 2016). The benefits of proper maternal dietary practices to the foetus extend to early childhood and even adulthood. Studies have found that individuals whose mothers ate a healthy, balanced diet during pregnancy have minimized risk for non-communicable diseases (NCDs) such as obesity, diabetes and hypertension later in life, relative to those whose mothers did not follow appropriate dietary (Dereń *et al.*, 2017). Prior research in epigenetics, including the work of Barker and Thornburg (2013), explains these mechanisms. According to the authors, the environment of the foetus and the frequent changes in the fetal metabolic pathways (due to maternal poor dietary habit) create epigenetic changes that contribute to the development of diseases later in life (Barker & Thornburg, 2013).

Despite the benefits of proper dietary habit, many pregnant women do not meet daily nutritional requirements, especially those regarding fruit and vegetable intake (Nash *et al.*, 2013). This is partly as a result of the physiological and physical changes women go through during pregnancy, which affect their eating. While some lose appetite for foods which were previously their favorite, others develop aversion for certain foods (Yalew *et al.*, 2019). Some also experience frequent excessive vomiting which negatively affect their food intake (Masoumi *et al.*, 2016). Some even develop taste for non-food items including pica (Handiso, 2015). At the individual level, factors such as knowledge, beliefs and perceptions about nutrition and health and socio-economic status have also been identified to influence pregnant women's dietary habit (Mirsanjari *et al.*, 2012; Sharifirad *et al.*, 2013).

The energy requirement in the first trimester is similar to the pre-pregnancy period. However, the demand increases with increasing gestational age, as the foetus grows (Dereń *et al.*, 2017). Fundamental aspects of healthy dietary behaviors during pregnancy include eating foods that provide both macro and micronutrients and adequate amount of energy. This is critical for maternal weight control and the general wellbeing of the foetus. Adhering to general and pregnancy-specific dietary recommendations is therefore key (Forbes *et al.*, 2018). The World Health Organization (WHO; 2020) recommends at least 400 g (i.e. five portions) of fruits and vegetables per day for adults, that their fat intake should not exceed 30% of total energy intake. Furtherance to that, intake of saturated fatty foods (e.g. fatty meat, butter, coconut and palm oil, cream etc.) and trans-fatty foods including those produced in industries (frozen pizza, pies, biscuits, and cooking oils) and those obtained from meat and dairy products from ruminant animals (e.g. cows, sheep, and goats) be kept to the minimum. Although these recommendations are for the general population, they may vary slightly with individual health status. However, it is recommended that trans-fatty foods of all kinds be avoided in a healthy diet (WHO, 2020).

The intake of fat and dietary fibre and its role in pregnancy has been extensively researched, with inconsistent findings. While some studies (Frederick *et al.*, 2005; Qiu *et al.*, 2008) found an inverse correlation between dietary fiber intake during pregnancy and risk of preeclampsia, others, including Willett (1998), reported that fiber intake during pregnancy was not associated with the development of preeclampsia. However, with the use of a single 24-hour dietary recall, it is important to highlight the possibility that the findings from Willett's (1998) study did not represent the usual dietary habit of the respondents. In Frederick *et al.* (2005) study also, respondents completed Food Frequency Questionnaire (FFQs) at the end of the pregnancy and so recall bias could have been a major limitation in the study.

Optimal foetal growth and development, particularly neurodevelopment, requires several essential nutrients, including docosahexaenoic (DHA) and eicosapentaenoic acid (EPA), which are only obtained from dietary sources such as seafood and supplements from fish oil (Coletta, Bell, & Roman, 2010).

Dietary behaviours are key modifiable factors that can significantly affect pregnancy outcome

(Mcdougall *et al*., 2021). An understanding of these behaviours, including their variability according to demographic, socio-economic and cultural diversities (Agyei *et al*., 2021), could provide the foundational knowledge to guide the development of nutritional policies and programmes for pregnant women in Ghana amidst the growing trend of NCDs in the general population. This study assessed pregnant women's fat and fiber consumption and factors affecting this behaviour.

2. MATERIALS AND METHODS

Study Design

This was a hospital-based descriptive cross-sectional study that employed a quantitative approach.

Study Population and Area

Pregnant women accessing antenatal care (ANC) at the Presbyterian Hospital in Dormaa Ahenkro in the Bono Region of Ghana formed the study population. Dormaa Ahenkro is the administrative capital (both political and traditional) of the Dormaa Central Municipality, with the Presbyterian Hospital being the largest secondary-level healthcare facility in the municipality. The hospital was established in 1955 by the Presbyterian Church of Ghana as a primary health care facility. Since its establishment, the hospital has undergone a massive expansion in terms of infrastructure, logistics and staff. In 2016, an ultra-modern pediatric unit was built in the facility to meet the growing demands and healthcare needs of the residents of Dormaa Ahenkro and neighboring towns. Currently, the hospital provides both general and specialized services, including medical and surgical care to its clients. In particular, attendance at the ANC unit has improved considerably over the years, from 759 in 2012 to 2,154 in 2020. This is largely as a result of the recent improvement in medical services at the hospital, including the introduction of specialist consultation and services at the ANC unit. The unit runs from Monday through to Friday, with an average monthly attendance of about 300 clients. Routine services provided at the unit include assessment of mother's general health status, folic acid and iron supplementation, education and counselling on maternal nutrition, monitoring of foetal conditions, provision of insecticide treated bed nets and malaria preventive therapy, counselling on family planning, and treatment of both obstetric and medical conditions. The frequency of visits to the unit is dependent on the client condition. However, for clients without any obstetric and/or medical condition that may require frequent assessment by an obstetrician, general physician or a midwife, the number of visits per month (i.e. after registering at the ANC unit) is usually one for first and second trimester and two for third trimester until delivery.

Sampling

The sample size for the study was determined using the Yamane's (1967) formula:

$$n \geq \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size (300, i.e. the average monthly attendance at the ANC unit of the Dormaa Presbyterian Hospital), and e is the acceptable sampling error which is 5% (0.05). Based on this information, the sample size for study was calculated as;

$$n \geq \frac{300}{1 + 300(.05)^2}$$

$$n \geq 171.43$$

With an error margin of 15% allowed for incomplete questionnaires, the total sample size was estimated to be 200.

Respondents were recruited via convenience sampling technique, thus based on their readily accessibility and willingness to participate in the study. Criteria for inclusion in the study were; (1) pregnancy, confirmed by ultrasound scan, (2) living within Dormaa Central Municipality, registered and attending ANC at the Presbyterian Hospital, (3) generally in good health, and (4) willing to participate in the study voluntarily. Women who met the inclusion criteria but had a known pre-existing diet-related medical condition (e.g. diabetes) which could have influenced their dietary habit were excluded from the study.

Research Instrument

Respondents' fat and fibre consumption was assessed using a modified version of the Fat and Fibre Behaviour Questionnaire (FFBQ). The FFBQ is a 20-item questionnaire designed for assessing dietary behaviours, including frequency at which an individual consume or use food items and categories, that affect intake of fat and dietary fibre (Jersey *et al.,* 2013). Unlike other diet-related instruments such as 24-hour dietary recall which provides information on specific energy and macronutrient intake, the FFBQ gives information on general food patterns. Nine items in the FFBQ relate to frequency of consumption of particular high fat or high fibre foods, which are assessed on a five-point scale (ranging from 5= Never to 1= six or more days per week). Nine items relate to individuals' behaviour regarding cooking, eating or food choices. For example, type of bread or dairy products and this is assessed on a five-point Likert scale (ranging from 1= Never, to 5= Always). The option "Not applicable or do not know" is available for individuals who do not eat a particular food or are not aware of specific methods of cooking. Two items assess the number of servings of fruits (1 item) and vegetables (1 item) that is consumed each day. These two items, which are valid for a standalone assessment of individuals fruit and vegetable consumption, contribute to the fiber index and total index (Reeves *et al.,* 2015). The FFBQ offers a low-burden alternative for nutritional assessment as they are easily completed and scored. In addition, there are chances of having minimized recall bias when using FFBQ (Reeves *et al.,* 2015).

Data Collection

Data were collected in June 2022, at the ANC unit of the Presbyterian Hospital in Dormaa Ahenkro, on selected days for ANC (Monday-Friday). The exercise was led by EPO, with the assistance of two trained community health nurses. Potential participants (pregnant women) who visited the unit within the period scheduled for the data collection were approached by the interviewers after they had received their routine ANC services. The study was introduced to them, and those who were willing to participate in the research voluntarily were taken through the consent procedures. After obtaining informed consent, the interviewers read the questions and interpreted them in the local dialect (Asanti Twi) for the respondents. Responses received from them were recorded against the respective questions. Each question was read and interpreted twice to ensure that they were well understood before responses were entered on the questionnaire. Each interview lasted between twenty (20) and thirty (30) minutes.

Variables

The following variables were assessed:

- Independent (categorical) variable: maternal age, marital status, ethnicity, community of residence, educational status, employment status, and average monthly income.
- Dependent (continuous) variable: fat index, fiber index, and total index.

Data Analysis

Data were analyzed using Statistical Package for Social Sciences version 25 (IBM Corp, Armonk, New York, United States, 2017). Descriptive analyses were performed on respondents' socio-demographic and obstetric characteristics; the results were summarized using frequencies and percentages.

Mean and standard deviation were used to summarize the fat, fibre and total index of respondents. These variables were computed as follows:

- Fat index $= \frac{Sum\ of\ fat\ items}{number\ with\ valid\ response}$
- Fibre index $= \frac{Sum\ of\ fibre\ items}{number\ with\ valid\ response}$
- Total index $= \frac{Sum\ of\ all\ items}{number\ with\ valid\ response}$

A Mann-Whitney U and Kruskal Wallis (H) tests were conducted to determine the effect of maternal demographic, socio-economic, and cultural factors on their fat and fiber consumption. Where the results indicated a significant effect, a follow-up pairwise comparisons with adjusted p-values was performed to determine the difference in dietary behaviour (measured as fat index and fibre index) between the categorical variables. Median, interquartile range, Mann-Whitney U value, Kruskal Wallis (H) value, degree of freedom and p-value were reported. The results of the analyses were summarized in tables 1-5.

Ethical Consideration

The study was approved by the Research and Ethics Review Committee of the College of Health, Yamfo, Ghana. All participants gave verbal informed consents.

3. RESULTS

Socio-Demographic Characteristics of Respondents

Two hundred (200) pregnant women at different gestational ages participated in the study. Close to half (48.5%) of the respondents were between 25 and 35 years of age. A similar proportion of the participants indicated were married (45.0%). Akans formed the largest proportion of the study sample (65.0%). More than half (51.5%) of the participants finished Junior High School (JHS) and about one-third (34.0%) of them were self-employed. Average monthly income for 37.0% of the respondents was above GH¢ 1000. Most of the respondents (69.5%) were residents of rural communities (Table 1).

Table 1 Socio-demographic characteristics of respondents

Variable	Category	Frequency (n)	Percent (%)
Age	< 15 years	37	18.5
	15-24 years	47	23.5
	25-35 years	97	48.5
	> 35 years	19	9.5
Marital status	Single	60	30.0
	Cohabiting	50	25.0
	Married	90	45.0
Ethnicity	Akan	130	65.0
	Ewe	24	12.0
	Ga-Adangbe	16	8.0

Variable	Category	Frequency (n)	Percent (%)
	Others	30	15.0
Community of residence	Rural	139	69.5
	Urban	61	30.5
Educational status	No formal education	22	11.0
	Primary school	16	8.0
	JHS	103	51.5
	SHS	43	21.5
	College/university	16	8.0
Employment status	Student/unemployed	39	19.5
	Employed (self-employed)	68	34.0
	Employed (government)	41	20.5
	Employed (private)	52	26.0
Monthly income (GH¢)	< 50	4	2.0
	50 – 599	69	34.5
	600 – 1000	53	26.5
	> 1000	74	37.0

Note. N = 200. JHS, Junior High School; SHS, Senior High School.

Obstetric History of Respondents

As presented in table 2, the largest proportion of the respondents (45.0%) was in their third trimester. More than half (59.5%) of the women were nullips, thus pregnant for the first time.

Table 2 Obstetric history of respondents

Variable	Category	Frequency (n)	Percent (%)
Trimester	First	53	26.5
	Second	57	28.5
	Third	90	45.0
Parity	Nullip	119	59.5
	2-4 childbirths	71	35.5
	Grand parity	10	5.0

Note. N = 200. Nullip = pregnant for the first time. Grand parity = 5 or more childbirths.

Dietary Habit of Respondents

Table 3 presents respondents' fat and fibre index. There was 100% valid response for all the 20 items in FFBQ. The following were the mean scores and their standard deviations (SDs) obtained for fat items; eat chips or fried potatoes (2.05 ± 1.03), eat red meat (2.47 ± 1.09), eat meat products such as sausages (2.62 ± 1.01), eat take-away or 'fast foods' (2.77 ±

1.02), eat corn chips or nuts (2.73 ± 1.17), eat pastries, cakes, sweet biscuits (2.75 ± 1.09), eat sweets such as chocolates (2.73 ± 1.13), eat meat trimmed of fat (2.31 ± 0.99), remove chicken skin before cooking (2.35 ± 0.80), eat bread with margarine or butter (3.84 ± 0.80), eat low or reduced fat milk (2.53 ± 0.91), eat low or reduced fat varieties of ice-cream (2.32 ± 0.93), and eat low or reduced fatty cheese (3.07 ± 1.43). With regards to fibre items, the following means and SDs were recorded; eat vegetables (2.42 ± 1.18), eat fruits (2.87 ± 1.22), eat legumes (3.51 ± 1.57), eat high-fibre breakfast cereal (3.64 ± 3.94), eat whole meal spaghetti (2.43 ± 0.81), eat brown rice (2.40 ± 1.06), eat wholegrain/whole meal bread (2.49 ± 1.06). Respondents' fat, fibre, and total index were 2.65 (± 0.49), 2.82 (± 0.78), and 2.71 (± 0.38) respectively.

Table 3 Dietary habit of respondents

Items	Mean Score	SD
Fat items		
Eat chips, or fried potatoes?	2.05	± 1.03
Eat red meat?	2.47	± 1.09
Eat meat products such as sausages?	2.62	± 1.01
Eat take-away or 'fast foods'?	2.77	± 1.02
Eat corn chips or nuts?	2.73	± 1.17
Eat pastries, cakes, sweet biscuits?	2.75	± 1.09
Eat sweets such as chocolates?	2.73	± 1.13
Eat meat trimmed of fat?	2.31	± 0.99
Remove chicken skin before cooking?	2.35	± 0.80
Eat bread with margarine or butter?	3.84	± 0.84
Eat low or reduced fat milk?	2.53	± 0.91
Eat low or reduced fat varieties of ice-cream?	2.32	± 0.93
Eat low or reduced fatty cheese?	3.07	± 1.43
Fibre items		
Eat vegetables?	2.42	± 1.18
Eat fruits?	2.87	± 1.22
Eat legumes?	3.51	± 1.57
Eat high-fibre breakfast cereal?	3.64	± 3.94
Eat whole meal spaghetti?	2.43	± 0.81
Eat brown rice?	2.40	± 1.06
Eat wholegrain/whole meal bread?	2.49	± 1.06
Fat Index	2.65	± 0.49
Fibre Index	2.82	± 0.78
Total Index	2.71	± 0.38

Note. N = 200. SD, Standard Deviation.

Factors Affecting Respondents' Fat Consumption

A Mann-Whitney U and Kruskal-Wallis (H) tests were performed to determine factors affecting respondents' fat consumption. Kruskal-Wallis (H) test showed that ethnicity significantly affected pregnant women's fat index, $H(3) = 24.77$, $p = .001$. Akans (*Mdn (IQR)* = 2.69 (0.48)) recorded higher fat index than Ga-adangwes (*Mdn (IQR)* = 2.08 (0.44)) and Ewes (*Mdn (IQR)* = 2.35 (0.81)) and pairwise comparison with adjusted p-value showed that this difference was statistically significant: Akan vs. Ga-adangwe, **z** = 2.99, $p = .017$, **r** = -0.02; Akan vs. Ewe (**z** = 2.99, $p = .017$, **r** = -0.02). None of the other comparisons was significant after pairwise comparisons with adjusted p-values (all *ps* > .05).

Similarly, the fat index of urban community residents (*Mdn (IQR)* = 2.77 (0.92)) was higher than that of rural community residents (*Mdn (IQR)* = 2.62 (0.54)). Nonetheless, this difference was not significant, $U(N_{urban} = 69, N_{rural} = 139) = 4223.00$, **z** = - 0.04, $p = .965$. Also, pregnant women's educational status significantly affected their fat index, $H(4) = 10.17$, $p = .038$. However, pairwise comparisons with adjusted p-values did not indicate a significant difference between groups. Finally, maternal age ($H(3) = 1.79$, $p = .618$), marital status ($H(2) = 1.53$, $p = .466$), employment status ($H(3) = 6.09$, $p = .107$), and average monthly income ($H(3) = 1.71$, $p = .634$) did not significantly affect their fat index (Table 4).

Table 4 Kruskal-Wallis (H) test for comparison of maternal factors and fat behaviour

Variable	Fat index				
	Mdn	IQR	*H*	df	*p*
Age			1.79	3	.618
< 15 years	2.54	1.58			
15-24 years	2.54	0.54			
25-35 years	2.69	0.77			
> 35 years	2.77	0.62			
Marital status			1.53	2	.466
Single	2.54	1.15			
Married	2.69	0.56			
Cohabiting	2.54	0.54			
Ethnicity			24.77	3	.001*
Akan	2.69	0.48			
Ga-Adangwe	2.08	0.44			
Ewe	2.35	0.81			
Others	2.92	1.02			
Community of residence†			0.04	1	.965
Rural	2.62	0.54			
Urban	2.77	0.92			
Educational status			10.17	4	.038*
No formal education	2.54	0.58			
Primary school	2.38	0.6			
JHS	2.69	0.84			

Variable	Fat index				
	Mdn	IQR	*H*	df	*p*
SHS	2.85	0.85			
College/University	2.54	0.81			
Employment status			6.09	3	.107
Student/unemployed	2.92	0.31			
Employed (Self-employed)	2.69	0.62			
Employed (Government)	2.54	0.94			
Employed (Private)	2.62	0.38			
Average monthly income (GH¢)			1.71	3	.634
< 50	2.42	0.19			
50-599	2.69	0.54			
600-1000	2.69	0.73			
> 1000	2.54	1.00			

Note. N = 200. Mdn, median; IQR, interquartile range; df, degree of freedom; JHS, Junior High School; SHS, Senior High School. †Mann-Whitney U test; *Significant *p*-value.

Factors Affecting Respondents' Dietary Fibre Consumption

Table 5 illustrates the results of a Mann-Whitney U and Kruskal-Wallis (H) tests for comparison of maternal factors and fibre behaviour. Kruskal-Wallis (H) test showed that respondents' age significantly affected their fibre index, $H(4) = 28.21$, $p < .001$. Women above 35 years of age (*Mdn (IQR)* = 2.54 (1.58)) recorded high fibre index than those in other age groups; below 15 years (*Mdn (IQR)* = 2.77 (0.62)), 15-24 years (*Mdn (IQR)* = 2.77 (0.62)) and 25-35 years (*Mdn (IQR)* = 2.69 (0.78)). A pairwise comparison with adjusted *p*-value showed that this difference was statistically significant: > 35 years vs. < 15 years, **z** = - 5.08, *p* = .018, **r** = - 0.36; > 35 years vs. 15-24 years, **z** = - 4.40, *p* = .018, **r** = - 0.31; > 35 years vs. 24-35 years, **z** = - 3.71, *p* = .018, **r** = - 0.26.

The test also showed that respondents' educational status significantly affected their fibre index, $H(4) = 28.30$, $p = .001$. Those who finished JHS (*Mdn (IQR)* = 2.86 (1.29)) had higher fibre index than those who had no formal education (*Mdn (IQR)* = 2.57 (0.43)) or attended college (*Mdn (IQR)* = 2.43 (0.12)). A pairwise comparison with adjusted p-values revealed that this difference was significant: JHS vs. no formal education **z** = - 3.07, *p* = .022, **r** = - 0.27, JHS vs. college education, **z** = 3.13, *p* = .018, **r** = 0.29. Also, women who finished SHS (*Mdn (IQR)* = 2.86 (1.29)) recorded higher fibre index than those who had no formal education (*Mdn (IQR)* = 2.57 (0.43)), attended a primary school (*Mdn (IQR)* = 2.71 (0.86)), or a college (*Mdn (IQR)* = 2.43 (0.12)). A pairwise comparison with adjusted p-values showed that this difference was significant: SHS vs. no formal education, **z** = - 3.89, *p* = .001, **r** = - 0.48; SHS vs. primary school, **z** = - 2.92, *p* = .035, **r** = - 0.38; SHS vs. college, **z** = 3.89, *p* = .001, **r** = 0.51. None of the other comparisons was significant after pairwise comparisons with adjusted p-values (all *ps* > .05).

Again, Kruskal-Wallis (H) test revealed that respondents' marital status significantly affected their fiber index, $H(2) = 13.49$, $p = .001$. Mothers who were single (*Mdn (IQR)* = 2.71 (0.71)) recorded higher fibre index than those co-habiting (*Mdn (IQR)* = 2.71 (0.43)), but lower fiber index than married women (*Mdn (IQR)* = 2.86 (0.86)). A pairwise comparison with adjusted p-values showed that this difference was significant: single vs. co-habiting, **z** = - 2.59, *p* = .029, **r** = - 0.18;

single vs. married, **z** = - 3.57, *p* = .001, **r** = - 0.25. None of the other comparisons was significant after pairwise comparisons with adjusted p-values (all *ps* > .05).

The ethnic group a woman belonged to also affected their fibre index, $H(3) = 23.92$, $p < .01$. Akans recorded lower fibre index (*Mdn (IQR)* = 2.57 (0.86)) than Ga-adangwes (*Mdn (IQR)* = 3.00 (0.43)) and Ewes (*Mdn (IQR)* = 2.86 (1.86)). A pairwise comparison with adjusted p-values showed that this difference was significant: Akans vs. Ga-adangwes, **z** = - 2.65, *p* = .048, **r** = - 0.19; and Akans vs. Ewes, **z** = - 4.32, *p* < .01, **r** = - 0.31. None of the other comparisons were significant after pairwise comparisons with adjusted p-values (all *ps* > .05). The fiber index of rural community residents (*Mdn (IQR)* = 2.71 (0.86)) was higher than those of urban community residents (*Mdn (IQR)* = 2.86 (0.57)). A Mann-Whitney test indicated that this difference was statistically significant, $U(N_{urban} = 61, N_{rural} = 139) = 5097.00$, **z** = 2.29, *p* = .022.

Finally, respondents' employment status ($H(3) = 3.11$, $p = .375$) and average monthly income ($H(3) = 2.97$, $p = .396$) did not significantly affect their fibre index.

Table 5 Kruskal-Wallis (H) test for comparison of maternal factors and fibre behaviour

Variable	Fibre Index				
	Mdn	IQR	*H*	df	*p*
Age			28.21	3	.001*
< 15 years	2.54	1.58			
15-24 years	2.54	0.54			
25-35 years	2.69	0.78			
> 35 years	2.77	0.62			
Marital status			13.49	2	.001*
Single	2.71	0.71			
Married	2.86	0.86			
Cohabiting	2.71	0.43			
Ethnicity			23.92	3	.001*
Akan	2.57	0.86			
Ga-Adangwe	3.00	0.43			
Ewe	2.86	1.86			
Others	2.86	0.29			
Community of residence			2.29	1	.022*
Rural	2.71	0.86			
Urban	2.86	0.57			
Educational status			28.30	4	.001*
No formal education	2.57	0.43			
Primary school	2.71	0.86			
JHS	2.86	1.29			
SHS	2.86	0.14			
College/University	2.43	0.11			
Employment status			3.11	3	.375

Variable	Fibre Index				
	Mdn	IQR	*H*	df	*p*
Student/unemployed	2.86	0.43			
Employed (Self-employed)	2.71	0.57			
Employed (Government)	2.57	1.29			
Employed (Private)	2.79	0.43			
Average monthly income (GH¢)			2.97	3	.396
< 50	2.57	0.00			
50-599	2.86	0.57			
600-1000	2.71	0.43			
> 1000	2.86	1.57			

Note. N = 200. Mdn, median; IQR, interquartile range; df, degree of freedom; JHS, Junior High School; SHS, Senior High School. †Mann-Whitney U test; *Significant *p*-value.

4. DISCUSSION

This study assessed pregnant women's consumption of fat and dietary fibre and socio-economic and cultural factors affecting this behaviour. The findings of this study indicate that the mean fat index (2.65 ± 0.49) of our respondents is inconsistent with the findings of the Logan Healthy Living Program in Australia. This randomized control study among Australian diabetes and hypertension patients, reported a relatively higher fat index in both the telephone counselling (intervention) group (3.27 ± 0.51) and the usual care (control) group (3.21 ± 0.53) (Reeves *et al*., 2015). The difference in study findings could be explained in part by the fact that pregnancy affects food selection and eating habit of women, and therefore their fat consumption. For instance, in a community-based study in Boricha Woreda, Southern Ethiopia, nearly, seven in ten (69.2%) pregnant women were averted to at least one food (Moges *et al*., 2015). Another possible reason for the difference in study findings is that during pregnancy, motivation for eating a healthy diet may change compared to the non-pregnant state, as women prepare for motherhood and consider the impact of their dietary intake on the child's health (Forbes *et al*., 2018; Kibr, 2021). The current finding has important implications on the general wellbeing of both the mother and the baby, considering that excess fat intake could contribute to unhealthy weight gain in the pregnant women (WHO, 2020), and yet essential fatty acids such as DHA and EPA are essential for foetal growth and development (Coletta *et al*., 2010).

The results of our study also showed that the fibre index (2.82 ± 0.78) of the respondents was inconsistent with the findings of the Logan Healthy Living Program. Although it was lower than the mean fibre index (2.73 ± 0.60) of the intervention group (telephone counselling), the fiber index in our study was relatively higher than the control group (usual care) in the Logan Healthy Living Program (2.59 ± 0.66) (Reeves *et al*., 2015). In the Eating Pattern Study, a randomized clinical trial in the United States (Beresford, Kristal, & Curry, 1997), the baseline mean fibre index for the intervention group (1.84 ± 0.36) was almost the same as that of the control group (1.84 ± 0.37). Compared to the current findings, the mean fibre index for both the intervention group and control group in Eating Pattern Study were low, and may suggest that our respondents were doing well in terms of dietary fibre intake, especially considering that the motivation for eating a healthy diet may change relative to the non-pregnant state due to the physical and physiological changes women go through during pregnancy (Forbes *et al*., 2018). Another possible explanation for the relatively high fiber index in the current study is the fact that most of the respondents lived in rural communities where they could have access to green leafy vegetables, fresh fruits and other dietary fibre, compared to those in urban communities where, for cost and non-availability, some women would not be able to meet the daily dietary fibre requirement.

Our study found that several factors affected fat and fiber behaviour of pregnant women. Among them was age. Consistent with the current finding is that of Pretorius and Palmer (2021) who found a significant association between dietary fiber intake and maternal age. Our study further showed that women above 35 years of age had significantly higher fibre index than those below 15 years, between 15-24 years and 25-35 years. The difference in fiber index between 'old' and 'young' women could be as a result of the experience the 'old' women had had in pregnancy which could have helped them cope with the physical and physiological changes in pregnancy, which are often associated with unpleasant symptoms such as vomiting, loss of appetite and development of aversion for certain foods (Grenier *et al*., 2021).

The results of our study also indicated that the ethnic group a pregnant woman belonged to significantly affected their fat and fiber index. Particularly, Akans recorded higher fat index but lower fiber index than Ga-adangwes and Ewes. Although previous studies have found an association between dietary habit and race/ethnicity, it is somewhat difficult explaining what could have accounted for the variations in fat index between the ethnic groups. However, a study investigating food taboos among residents of Ashongman in the Greater Accra region of Ghana found that unlike Akans, Ewe and Ga women who were pregnant abstained from eating beef on reason that they wanted to stay healthy (Gadegbeku *et al*., 2019) and this could have explained for the difference in fat index. It is, however, important that extensive research is conducted to assess how ethnicity affect the dietary habit of pregnant women in Ghana.

Another important finding of the current study was that pregnant women who lived in urban communities recorded significantly higher fiber index than those in rural communities. This finding was inconsistent with the results of a study in Poland which reported that pregnant women in urban communities of Kielce Region frequently ate vegetables, whole meal cereal products and other fibre than rural residents, even before becoming pregnant (Suliga, 2017). The findings of our study suggest that residents of rural communities ate more dietary fiber (such as fruits, vegetables, legumes, high-fibre breakfast cereal etc.) than urban residents, and could be due to the fact that most of our respondents were residents of rural communities where they could have access to green leafy vegetables, fresh fruits and other dietary fibre, compared to those in urban communities where, due to cost and non-availability, some women would not be able to meet the daily dietary fibre requirement. Furthermore, the findings of our study indicated that respondents from urban communities had higher fiber index than those from rural communities. A possible reason for the variations in fat index between urban and rural residents was that many of the food items in FFBQ, particularly fat component which includes chips, sausages, pastries, cakes, sweet biscuits, chocolates, and ice-cream are sold in supermarkets in urban communities which could have limited rural community residents' accessibility or increased urban community residents' accessibility and patronage of these foods.

Our study also found that educational status of respondents significantly affected their fat and fibre index. Although there was no significant difference between groups for fat index, pregnant women who finished JHS or SHS recorded significantly higher fibre index than those who attended college. This study produced results which were inconsistent with the findings of Freisling *et al*., (2017). In a study among Austrian pregnant women, Freisling *et al*. (2017) reported that high educational status positively affected intake of dietary fiber. A possible explanation for the rather contradictory results was that many college/university graduates in Ghana tend to seek employment in urban communities and if that was the case among respondents of this study, they might have had limited access to green leafy vegetables, and consequently consumption of dietary fibre. However, our study did not investigate respondents' pre-pregnancy fat and fiber behaviour which could have provided the basis to exclude the influence of pregnancy status on overall dietary fiber intake.

With regards to the effect of marital status on marital status, respondents who were married recorded significantly higher fiber index than those who were single or co-habiting. This result was consistent with those found in a study among women attending Kapenguria District Hospital in Kenya. In this study, Kemunto (2013) found significant differences in the dietary diversity score (DDS) of pregnant women who were separated (5.33 ± 3.79a) and those who were married (7.56 ± 1.3b). Aside from psychosocial support pregnant women probably received from their husbands which could have motivated them to adopt healthy eating behaviour amidst the eating problems associated with pregnancy (Grenier *et al.*, 2021), pregnant women who are single or cohabiting sometimes would not have the capacity to mobilize adequate financial resources to support their nutrition, especially if they became pregnant at a younger age or lost the support of their parents or intimate partner during the pregnancy (Appiah *et al.*, 2021). Whereas it is important to highlight these findings, efforts should be strengthened towards supporting pregnant women to adhere to dietary recommendations to improve their overall health status and the outcome of the pregnancy.

5. CONCLUSION

Our study found that several factors affect the fat and fiber behaviour of pregnant women. Among them were age, marital status, ethnicity, and community of residence. This research is one of the few studies conducted in the Dormaa Central Municipality to assess pregnant women's nutritional behaviours. Our findings, therefore, provide the foundational knowledge to guide the development of nutritional policies and programmes for pregnant women in Dormaa Central Municipality amidst the growing burden of diet-related NCDs in Ghana. Nutritional programmes developed to target pregnant women in the municipality should be tailored to the socio-cultural context and economic situation of the municipality.

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Conflict of Interest

None declared

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