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NUTRIENT INTAKE AMONG PREGNANT TEENAGE GIRLS ATTENDING ANTE-NATAL CLINICS IN TWO HEALTH FACILITIES IN BUNGOMA SOUTH DISTRICT, WESTERN KENYA
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E. K. SHIPALA, S. W. WAFULA, G. A. ETTYANG and E. O. WERE

ABSTRACT

***Objective*: To assess the adequacy of nutrient intake including proteins, energy, calcium, iron, folate and vitamin C and identify the factors associated with nutrient intake.**
***Design*: Cross sectional study.**
***Setting*: Healthy facility based. Bungoma District Hospital and Bumula Health centre.**
***Subjects*: Teenage pregnant girls attending Antenatal Clinic participated after providing written consent, with girls under 18 years being considered as emancipated minors. A standardised interviewer administered Food Frequency Questionnaire was used to asses the dietary intake. Nutrient calculator was used to determine the nutrient intake of the study participant.**
***Results*: The intakes of all selected nutrients were significantly lower than the RDA. Protein intake was significantly associated with Education (OR: 0.537; 95% CI: 0.318 – 0.907), income (OR: 0.049; 95% CI: 0.919 – 0.128) and perceived food shortage (OR: 0.617; 95% CI: 0.389 – 0.890). Energy intake was significantly associated with income (p=0.007, OR: 2.103; 95%CI: 1.225 – 3.608). Iron intake was significantly associated with perceived food shortage (OR: 2.548; 95% CI: 1.632 – 3.980). Hookworm affected calcium intake (OR: 3.074; 95% CI: 1.089 – 8.698) and malaria parasites affected folate intake (OR: 0.355; 95% CI: 0.226 – 0.557). Those with hookworm were 3 times more likely to have inadequate calcium intake as compared to those without.**
***Conclusion*: All the nutrients selected were lower than the Required Dietary Allowance. Level of education, income, Hookworm and malaria affected intake of various nutrients.**

INTRODUCTION

Nutrition influences growth and development throughout infancy, childhood and adolescence; however it is during the period of adolescence that nutrient needs are the greatest. As a result of rapid growth in stature, muscle and fat mass during the peak of the adolescent growth spurt, some dietary requirements are as high or higher in adolescents than any other groups (1). Several studies on dietary intake of pregnant adolescents indicate that their nutrient intakes are lower than the recommended dietary allowance. As in most developing countries, the nutrient intake of girls in Sub-Sahara Africa is compromised by the cumulative and synergistic effects of many risk factors. These factors include but are not limited to availability of, or access to, food resources caused by natural or human-made disasters, lack of control over inputs and resource allocation at the household level, traditional feeding practices and other customs that limit women's consumption of certain energy or nutrient rich foods, the energy demands of heavy physical labour, the nutritional demands of frequent cycles of pregnancy, low level of education, and a high burden of infections with limited access to curative or preventive cure (2).

Maternal diets during pregnancy need to provide nutrients for the mother as well as for foetal growth. Most pregnant adolescents often experiences discriminatory child care, feeding, and health care. These girls also face domestic violence, relational problems with families, partners or community. Usually they are treated inhumanely, experience stigma and have inadequate food to eat. These impacts negatively on their nutrient intake (3). The increased nutritional demands for adolescent growth coupled with chronic protein energy malnutrition (PEM) ,micronutrient deficiencies and early childbearing often prevents many teenage girls from fully realising their growth potential (4,5).

The diet of a chronically hungry adolescent girl cannot support adequately both her own growth and that of the foetus. Malnourished girls often give birth to underweight children (6). *The need for protein, energy, vitamins and minerals is increased by the metabolic demands of pregnancy especially for adolescents. Energy promotes fetal growth and allows for use of protein, vitamins and minerals. Calcium promotes increase in bone mineralization and reduces the risk of pre-eclamplsia. Iron needs are increased during pregnancy due to fetal and placental growth and expansion of blood volume. Adequate folate intake reduces the incidences of congenital anomalies as neural tube defects. Vitamin C enhances the absorption of iron and prevents infections (7).*

The unplanned nature of many adolescence pregnancies with increased need of both macronutrients and micronutrients leads to preterm delivery, stillbirth and neonatal death due to competing nutritional requirements of the developing fetus and the growing mother. The evident competition for nutrients affects the still growing mother and places offspring at a risk from low nutrient stores. Concurrent pregnancy and growth therefore worsen maternal nutrient deficiencies *(8). In studies to asses the nutrient intake of pregnant teenage girls in Guam, Nigeria, Tanzania and U.S.A – Florida specific nutrient intake including energy, protein, calcium, iron and folate was lower than the RDA (9).*

MATERIALS AND METHODS

The cross sectional study was carried out in Bungoma South District, Western Kenya in two health facilities namely; Bungoma District Hospital and Bumula Health Centre between October to December, 2008. The participants were 384 teenage pregnant girls attending antenatal clinic (ANC) at the two health facilities.

Inclusion and exclusion criteria: Pregnant teenage girls were enrolled into the study if they were aged 13 – 19 years, attending their first antenatal visit and willing to give a written informed consent to participate in the study. Teenage girls were excluded in the study if they had any physical disability, mental retardation, were unwilling to participate or incapable of providing a written informed consent. Although the age of maturity in Kenya is 18 years, pregnant teenagers below this age we considered emancipated minors and hence no parental consents were sought.

Data collection procedures: Dietary intake was assessed by means of a standardized interviewer administered Food Frequency Questionnaire. The questionnaire was also used to determine the factors associated with nutrient intake of pregnant teenage girls. Blood samples to test for malaria parasites and stool samples were collected and subjected to both Direct and Ritchet's concentration method for stool microscopy assessing for hookworm.

Data analysis: The data was cleaned, coded, entered and analyzed using SPSS version 12.0. A nutrient calculator (10) was used to analyse nutrient intake. Frequency tables and means were generated for categorical variables and continuous variables respectively. Chi square test of association was used to determine the association between adolescent nutrient intake as the outcome of interest and independent categorical variables. Multivariate logistic regression was used to determine the factors independently associated with nutrient intake. All p-values less than 0.05 were considered statistically significant.

The study was reviewed and approved by Institutional Research and Ethics Committee (IREC) of Moi University before the research commenced. Permission to carry the research was also obtained from Bungoma District Hospital administration that also covers Bumula Health Centre.

RESULT

We report data from 384 pregnant teenage women attending antenatal care in the two facilities in Western Kenya.

Table 1
Socio-economic Characteristics of the participants (N = 384)

Variable	N (%)
Age (mean)	17.7(sd 1.3)
Marital status	
Single	117 (30.5)
Married	267 (69.5)
Level of education	
None	9(2.3)
Primary	
Secondary	255(66.4)
Tertiary	9(2.3)
1st pregnancy	
Yes	285(74.2)
No	99(25.8)
Diet restrictions	
Medical	1 (0.3)
Religion	76 (19.8)
Cultural	306 (79.9)
Most restricted foods	
Eggs	145 (38)
Chicken	228 (59.7)
Others	9(2.4)
Food shortage	
Yes	248 (64.6)
No	136 (36.4)
Monthly income	
<100	253 (65.9)
500-2000	84 (21.9)
3000-5000	43 (11.2)
6000-10,000	4 (1)
Food source	
Garden	187(48.7)
Buying	197(51.3)

Table 1 indicates majority of the participants had attained primary level of education (64.4%) and they had restrictions not to eat some foods especially protein.

Figure 1
Family's view on pregnancy

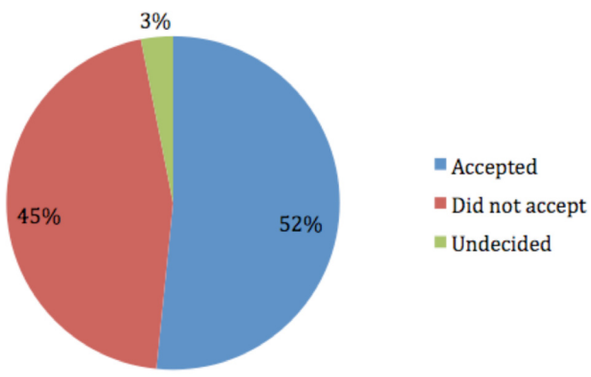


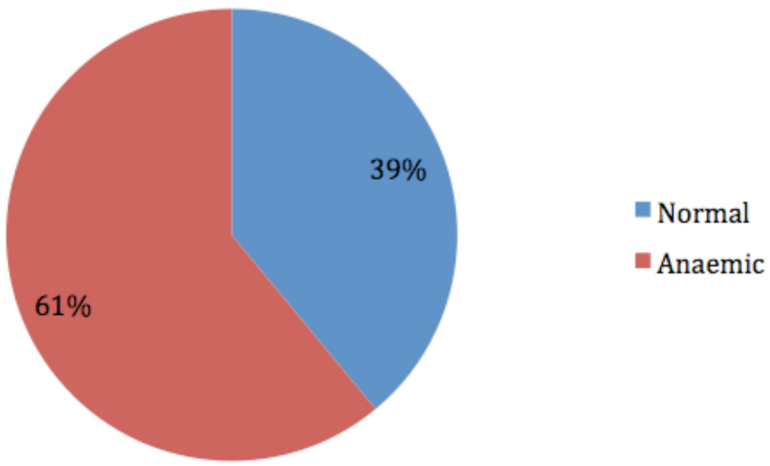
Figure 1 shows of the 384 teenage girls who were pregnant, 45.3% of the parents did not approve of the pregnancy but 51.6% accepted.

Table 2
Selected Nutrients Intake in Comparison to RDA (N=384)

Nutrient	RDA		Mean daily intake	% RDA Intake	p-value
Folate	400 µg		364.4µg	91	<0.001
Proteins	71g		55.8g	78.6	<0.001
Energy	2708 kcal		1983.6kcal	73.2	<0.001
Vitamin C	70mg		63.03mg	90	<0.001
Calcium	1300mg	39%	695.4mg	53.	<0.001
Iron	30mg		26.8mg	89.	<0.001

One sample t-test was used to test whether the daily intakes were significantly lower than the RDA value. The daily nutrient intake (folate, protein energy, vitamin C, calcium and iron) were significantly lower compared to RDA (all p<0.001) as shown in table 2.

Figure 2
Prevalence of Anaemia among the study participants (n = 384)



Among the 384 pregnant adolescents studied, 61% were anemic as shown in figure2.

Table 3
Protein intake and associated factors

Factor	Protein intake Adequate	Inadequate	p-value
Education			
Primary and below	81	183	
Secondary and above	22	98	0.019
Income			
>kshs 100	45	86	<0.001
≤kshs 100	5	195	
Perceived food shortage	58	190	
	45	91	0.04

Protein intake was significantly associated with Education (OR: 0.537; 95% CI: 0.318 – 0.907), income (OR: 0.049; 95% CI: 0.919 – 0.128) and perceived food shortage (OR: 0.617; 95% CI: 0.389 – 0.890

Table 4
Logistic regression

Variable	B	SE	Wald	df	Sig	OR	95% CI for OR	
Education(≤ primary)	-0.622	0.268	5.40	1	0.020	0.538	0.318	0.907
Income (>100)	-0.306	0.489	38.06	1	0.000	0.49	0.019	0.128
Food shortage(no)	-0.482	0.236	4.18	1	0.041	0.617	0.389	0.980

Energy intake was significantly associated with income (p=0.007, OR: 2.103; 95%CI: 1.225 – 3.608)

Table 5
Logistic regression of Energy intake and income

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B) Lower	Upper
income(kshs <100)	.743	.276	7.275	1	.007	2.103	1.225	3.608
Constant	-1.638	.238	47.149	1	.000	.194		

Iron intake was significantly associated with perceived food shortage (OR: 2.548; 95% CI: 1.632 – 3.980)

Effects of hookworm and malaria on nutrient intake
Hookworm affected calcium intake (OR: 3.074; 95% CI: 1.089 – 8.698) and malaria parasites affected folate intake (OR: 0.355; 95% CI: 0.226 – 0.557).

DISCUSSION

In the study population, the nutrients selected for evaluation were below the RDA and the prevalence of anemia was 61%. Calcium intake was highly inadequate 96.1%, followed by energy 75.3%, protein 73.2%, iron 68.5%, Vitamin C 56.8% and folate 55.2%, (66.7%) had attained primary level of education and 65.9% had a low income level which agrees with other previous studies that most girls with low level of education and income are likely to get pregnant during adolescent years (11,1). The low level of education and income affected the protein intake of the teenage pregnant girls. The pregnant adolescents also got most of their foods from the market (51.3%) which meant with low income they did not have the ability to purchase the foods they needed in pregnancy, and like the study done by (12) in Gabon, the girls depended either on their parents or husbands to provide for the food and hence they did not have much input on food choices.

Majority of the study participants (64.6%) reported experiencing perceived food shortage and cultural food restriction in the area, the most restricted foods were eggs and chicken which contain protein that is crucial for both the growth of the mother and the fetus. In some Kenyan communities pregnant women are restricted from certain foods because of cultural beliefs that certain foods cause harm to the mother and the fetus (13). Other studies (8,6) that were carried out in areas with food insecurity, adolescent girls were more vulnerable to inadequate food intake. Restricted food intake by pregnant women compromise their nutritional status and further affect the birth outcome. The food shortage in this study population could be resulting from most farmers in the area concentrate on sugarcane farming than food crops. The level of poverty in the district is 53%. Also 51.3% buy the food from the market; this meant they could only buy food within their means and not what was required to meet their nutritional needs.

The pregnant adolescents had inadequate intakes of the selected minerals (calcium and iron) and vitamins (Vitamin C and Folate). The same results have been reported in adolescent and adult pregnant women (8, 14, 15).

Folate intake was significantly associated with malaria parasites while iron and calcium were affected by hookworm parasites these findings agrees with (16) studies on developing countries. As folate deficiency may generate anaemia (17) or even foetal neural tube defects, the low consumptions of folate in this study area could expose the population to a high risk during pregnancy. Iron deficiency-induced anaemia has adverse effects for the mother (tiredness, reduced physical and mental performance, and reduced immune function) as well as for the foetus (prematurity, low weight at birth, and infection) (18).

The study shows that the teenage pregnant nutrient intake in the study population was low, despite the fact that it's an agricultural area. Most farmers in this area concentrate on sugarcane farming more than food crops; hence there is inadequate food to provide the nutrients needed. The rate of poverty in the district is 53% (19). The selected nutrients which

are important in pregnancy for energy, blood building and bone development were all inadequate.

In conclusion, the selected nutrients intake in the study population was below the RDA. Education level, income level and perceived food shortage affected the various nutrient intakes of the study participants. The antenatal care should include Continuous Nutrition Education, de-worming. The government should introduce calcium, iron and folate supplementation.

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REFERENCES

1. Wallace, J., Bourke, P., Silva, P. and Aitken, R. Nutrient Partitioning during Adolescent Pregnancy. *The Journal of the Society of Reproduction and Fertility*. 2001; **122**: 347-357.
2. Butte, N. F. and King, J.C. Energy requirements during pregnancy and lactation. *Public Health Nutrition*. 2001; **8**: 1010-1027.
3. Atuyambe, L., Mirembe, F., Johansson, A., Kirumira, K. E. and Faxelid, E. Experiences of Pregnant Adolescents-Voices from Wakisho District, Uganda. African Health Sciences.
4. Martorell, R., Kettle, K. L. and Schroender, D. G.1994. Reversibility of stunting: Epidemiological findings from children from developing countries. *European Journal of Clinical Nutrition*. 2005; **48 (S1)**: 545-557.
5. World Health Organization. 1995. Maternal Anthropometry and pregnancy outcomes: A WHO Collaborative study. Bull WHO 73 (Suppl).
6. Claude, G. 2007. Food Insecurity, Malnutrition and Poverty in Sumba. Jakarta. Post.
7. Johnson,R. K., Johnson, D. G., Wang, M. Q. Characterizing Nutrient intakes of Adolescents by Socio-demographic factors. *Journal of Adolescent Health.* 1996; **15**: 149 – 154.
8. Giddens, J. B., Krug S. K., Tsang, R. C., Guo, S., Miodovnik, M. and Prada, J. A. Pregnant adolescent have similar low intakes of selected nutrients. *Journal of American Dietetic Association.* 2000; **100**: 1334 – 1340.
9. World Health Organization. 2005. Nutrition in adolescence. Issues and challenges for the health sector: Issues in adolescent health sector and development.
10. Sehmi, J. K. National Food Composition Tables for Successful diets in Kenya. Nairobi: Public Health Laboratories, Ministry of Health, 1994.
11. Berglund, S., Liljestrand, J., Marin, F. D. M., Salgado, N. and Zelaya. E. The Background of adolescent pregnancies in Nicaragua: a qualitative approach. *Social Science Medicine.* 1997; **44**: 1-12.
12. Nawal, M. N. Child Marriage: A silent Health and Human Rights Issue. *Reviews in Obstetrics and Gynecology*. 2009; **2**: 51-56.
13. Alemu, M. Cross Section Maasai primigravidae dietary and pregnancy outcome study in Loitokitok, Kenya.
14. Oguntona C. R. B. Food and nutrient intakes by pregnant Nigerian adolescents during the 3rd trimester. *Nutrition*. 2000; **18**: 673-679.
15. Pobocik, R., Benavente, J., Bourdreau, N. and Spore, C. Pregnant Adolescents in Guam Consume diets low in Calcium and other micronutrients. *Journal of the American dietetic Association*. 2003; **103**: 611-614.
16. Hawdon, J. M. and Hotez, P. J. Hookworm: developemental biology of the infectious process. *Curr Opin Genet Dev*. 1996; **6**: 618-623.
17. Green, R. and Miller, J. W. Vitamin B-12 deficiency in the dominant nutritional cause of hyperhomocysteinemia in a folic-fortified population. *Clinical Chemistry lab med*. 2005; **43**: 1048 – 1051.
18. Scholl, T. O., Hediger, M. L., Cronk, C. E., *et al*. Maternal growth during pregnancy and lactation. *Horm Res*. 2000; **59**.
19. Bungoma District Strategic Plan, 2005 - 2010.