Dietary Intake-Among Pregnant Women Attending Ante-Natal Clinic AtKisiiLevel 5 Hospital, Kenya

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Abstract: *Nutrient deficiencies among infants, children, pregnant and lactating mothers are of public health concern in the developing countries. Nutrition focus has in the past been on vitamin A and iron status of children below five years with little on maternal iron status and dietary habits. Studies on dietary intake among pregnant women are limited in Kenya. This study assessed the dietary patterns, nutrient intake levelsand sources of nutrition education information among pregnant mothers attending Ante-Natal Clinic (ANC) at Kisii level 5 Hospital, Kisii County, Kenya. A total of one hundred and two (102) expectant mothers attending their first ANC were selected using systematic random sampling between February and March 2014. Data on food and nutrient intake were collected using pretested 24-hour diet recall and Food Frequency Questionnaires.Data was analysed usingtheNutrisurvey 2007 and nutrition education information was analysed using SPSS version 17.0. Results showed a deficit in consumption of Folic acid, Calcium and Iron with respect to the Recommended Dietary Allowances (RDA).The study results also indicated that 82.4% of the women had nutrition education information whose major source was the hospital nutritionist as reported by 41.6%. In conclusion consumption of tea, coffee and cocoa with iron and calcium rich foods is common a habit that hinders bioavailability of iron among the women. The studyrecommendedintake of iron-rich and vitamin C foods for pregnant women.*
Key words*:Dietary intake, Pregnancy, Nutrients, Nutrition education.*

I. Introduction

It is estimated that 80% of pregnant women in developing countries do not meet their Recommended Dietary Allowance (RDA) for Iron and 25% of these women have extremely low Vitamin A intake therefore resulting in clinical and sub clinical signs of iron and vitamin A deficiencies [1].These deficiencies have implications on maternal nutritional status and health that may ultimately affect birth outcomes [2].Iron deficiency is probably the most common nutritional cause of anaemia in pregnancy, because the physiological changes associated with pregnancy exert a demand for additional iron needed for transfer to the foetus. Nutrition anaemia results when there is inadequate body store of iron needed for haemoglobin synthesis. In addition to iron, several other micronutrients are important for haemoglobin (Hb) synthesis [3]. Vitamin A Deficiency (VAD) is a significant factor in many cases of anaemia and can contribute to incomplete Hb recovery after iron supplementation.One of the strategies of meeting increased nutrient needs is through utilization of locally available foods including fruits and vegetables which most of the times are produced by families for sale[4].

In Kenya, efforts which havebeen made at the national levelincludesprovision of haemanitics (ferrous sulphate and folic acid) to all pregnant mothers to reduce anaemia but high rates of maternal and perinatal morbidity and mortality are still observed [5].The National Micronutrient Survey (2011) and National Food Consumption Report(2013), indicated that 30% of pregnant women in Nyanza do not meet the increased requirement for nutrients during pregnancy [6, 7].Poverty, lack of nutrition knowledge and poor attendance to Ante Natal Clinic (ANC) by pregnant women are among the socio demographic indicators associated with inadequate maternal dietary intakes[7].A study on dietary intake and dietary quality of low-income adults in the Supplemental Nutrition Assistance Program [8] established that few low-income adults consumed recommended amountsof whole grains, fruit, vegetables, fish, and nuts/seeds/legumes.Conversely, many low-income adults exceeded recommended limitsfor processed meats, sweets, and bakery desserts and sugar-sweetened beverages[8]. Inappropriate dietary practices on the other hand characterised by poor dietary intakes, reduced number of meals and inadequate consumption of fruits and vegetables among pregnant women contribute to under nutrition that may cause complications and poor birth outcomes[9].

There is scanty literature to showdietary intake and nutrition education informationamong expectant mothers attending ANC at Kisii Level 5 hospital, in Kisii County .The present study was conducted to fill thisgap in the knowledge.

II.   Methods

A cross-sectional research design was employed in collection of data. This study was conducted at Kisii level 5 hospital, the largest government owned health facility in the County located in Kisii town, South-Western Kenya. According to the *Kenya Demographic and Health Survey 2008-09,* the town is vibrant with population of about 83,000, but has a large dependent metropolitan population of over 100,000 residents [10]. The target and accessible population group comprised pregnant women attending their booking visit at Kisii Level 5 hospital.A total of 102 pregnant women were selected using the systematic random sampling in the month of February and March 2014. This period was preferred as it is the low malaria season in Kisii County[11].

2.1 Data Generating Tools And Procedures

A pretested questionnaire containing structured and closed ended questions was used to collect data.The questionnaire was divided into three sections: demographic information, dietary consumption and nutrition education information.

Dietary intake was assessed using 24 hour recall and Food Frequency Questionnaire (FFQ). In the 24-hour dietary recall, the respondents were asked to recall and report all the foods and beverages consumed in the preceding 24 hours. The interview used structured questions, with specific probes, to help the respondent recall all foods consumed throughout the day[12]

Food FrequencyQuestionnaires (FFQ's) approach also asked respondents to report their usual frequency of consumption of each food from a list of foods for a specific period(pretesting of the instruments was used to determine foods eaten in the area). This was used to capture intake of food over a given period, that is, a month, three months or a year. FFQs provide reasonable estimates of average energy and nutrient intake.FFQ were used to circumvent recent changes in diet (e.g., changes due to disease) by obtaining information about individuals' diets as recalled about a prior time period. Food models and household measurements such as spoons, cups and plates were used to assist subjects in defining portion size. The two methods were used because the foods and amounts consumed on consecutive days of reporting may be varied and this increased representativeness of the individual's diet.

2.2 Data Analysis

Data was analysed using the Nutrisurvey 2007 and the Statistical Package for Social Sciences (SPSS) version 17.0 for windows. SPSS was used to analyse the required descriptive and inferential statistics using socio-demographic data (age, educational level, occupation) and nutrition education information.Nutrisurvey on the other hand was used to analyse nutrient intake of the women.

Further analysis was done to evaluate the relationship between diet intake and socio-demographic characteristics of mothers attending their booking visit at Kisii Level 5 Hospital, using cross tabulations and the Chi square test.

2.3 Recruitment And Training Of Research Assistants

Two research assistants, one with a degree in Food Science and another with a Diploma in Food Nutrition and Dietetics were recruited and trained. They were trained on interviewing and measuring techniques, field ethics in research and public relations while in the field. They did role plays prior to the survey to familiarize themselves with questions in the questionnaire, translate and ask in a way that the respondent could understand.

2.4 Ethical Review And Informed Consent

The study protocol was reviewed and approved by the Moi University Institutional Research and Ethics Committee (IREC). Ethical clearance was also given by Kisii Level 5 hospital Ethical Committee. Informed consent was then sought from all study participants before taking their details. The study participants were requested to fill a consent form before taking part in the study.

III.   Results

3.1 Demographic Characteristics Of Respondents

From the 102 respondents sampled, majority (85.3%) were from Kisii County a few (4.6%) from Nyamira and Homabay Counties (3.3%) respectively. Darajambili (13.7%) and Mwembe villages (8.3%) of Kisii County recorded the highest number of participants owing to their proximity to the hospital. This was an indication that majority of the respondents were living in the outskirts of Kisii town.

Almost half (41.1%) of the respondents were aged 21-25 years while 2.9% were above 35 years. The mean age of the respondents' was 24.7 ±4.6 years .The youngest respondent was aged 15 years and the oldest was 40years.The results also revealed that almost half (48%) of the mothers had attained secondary education

and about a third (35.3%) had post-secondary education. Most (77.1%) of the respondents had an income below Kshs. 10,000(US$116) per month. Over half (53.2%) of the mothers had an income below Kshs. 5,000 (US$58) while 23.9% had an income of between Kshs.6, 000 (US$68) and Kshs.10, 000 (US$116) per month respectively

3.2 Dietary Patterns Of The Respondents
Foods consumed by the respondents were classified into energy foods, proteins, fruits & vegetables and drinks.

3.2.1 Energy Foods
Data from the 24 hour recall and FFQ indicated that maize meal (stiff porridge) and other maize food products such as *Nyoyo* (mixture of cooked maize and beans) were the most (79.4%) consumed staples. It was also established that wheat products such as bread, doughnuts, *chapatti* (pastry) and *mandazi*(deep fried buns) were the second most consumed staples (9.3%).

3.2.2 ConsumptionofProtein Foods
Beans were the most consumed (40%) protein food by the respondents, while fresh milk was the second (24%) most frequently consumed. It was however noted that meats (beef, goat meat, and mutton), chicken and fish were the least frequently consumed proteins as shown in Fig. 1.
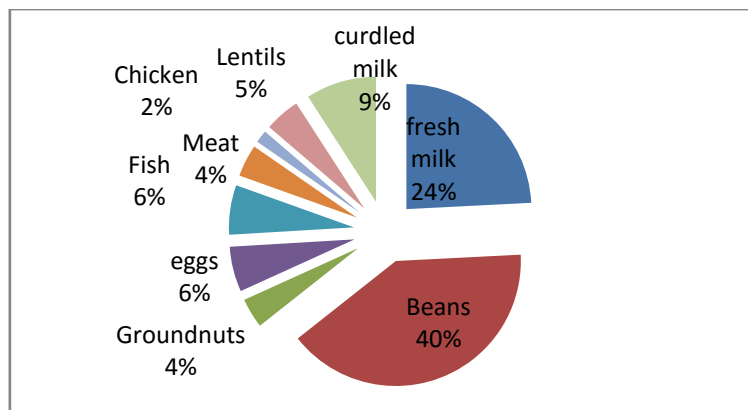

figure.1: protein consumption

3.2.3 Fruits And Vegetable Consumption
Fruits were rarely consumed and when they were, only negligible quantities were taken. It was however noted that a variety of green leafy vegetables were consumed by the respondents frequently at least once per day as shown in Fig. 2.
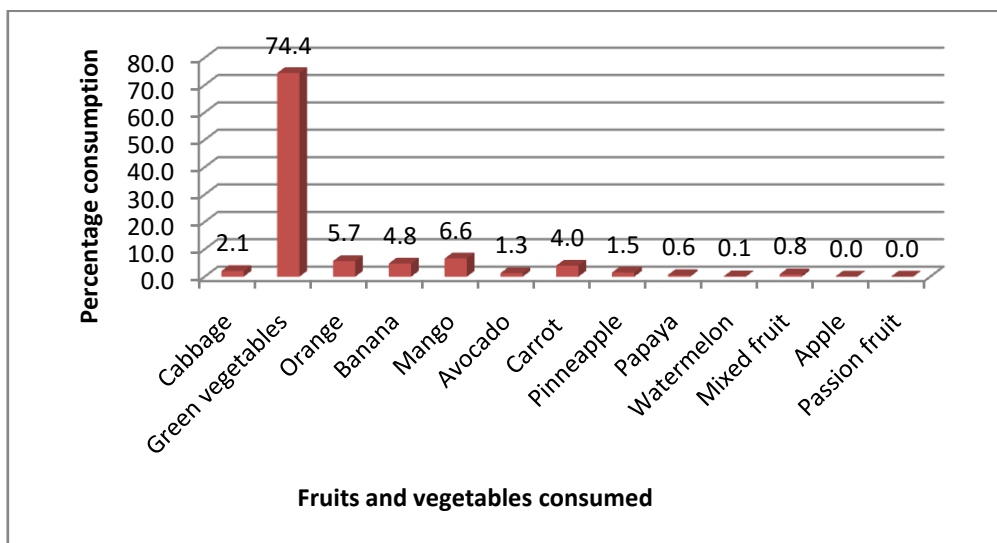
figure 2: frequently consumed fresh fruits and vegetable

3.2.4 Beverages

The most frequently consumed beverages were tea, coffee and cocoa. Additionally it was noted that 28.1% of the respondents took beverages less than 20 minutes before or after a meal while 18.6% took during a meal. Carbonated soft drinks and water were least consumed at 12.5% and 2.9% respectively as shown in Table 1.

Table 1: Frequently consumed drinks

Drinks	% consumption
Carbonated soft drinks	12.5
Tea, coffee and cocoa	84.5
Drinking water	2.9
TOTAL	100.0

3.2.5 Nutrient Intake of Respondents

The results showed that more than 40% of the women had either an average or recommended consumption of protein, vitamin A, vitamin C, and energy respectively as shown in Figure 4. However, Folic acid, calcium, vitamin C, and iron were deficient as recorded by, 56%, 55.9%, 23.7% and 44.1% respectively. Results indicated that there was over-consumption of vitamin A by 48.4% of the respondents as shown in Fig.4
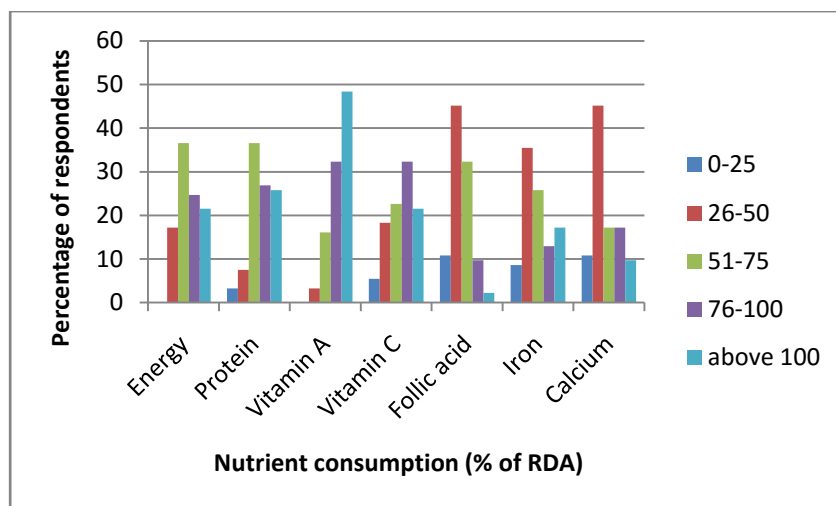

figure4:Respondents' nutrient intake

3.3 Nutrition Education

Majority (82.4%) of the women had some nutrition education while 17.6% had none. The major source of nutrition education was from the hospital nutritionist as reported by 41.6% of the women, followed by friends (27%). Only a few (6.4%) had their personal information on nutrition during pregnancy as shown in table 2. It was however noted that those whose source of education was from the hospital had acquired it on the day of their ANC visit.

Table 2: Sources of nutrition education

Source	Frequency(n=102)	Percentage
Hospital nutritionist	43	38.5
Personal information	7	6.4
Church	5	4.6
Spouse	2	1.8
Friends	28	25.7
Women group	1	.9
None	16	14.7
Total	**102**	**100**

Almost half (41.2%) of the respondents were satisfied with the nutrition education on how they should feed during pregnancy. Some of the respondents however, were either fairly satisfied (39.2%) or least satisfied (19.6%) with the amount of nutrition information they had as shown in Table 3.

Table 3: Level of satisfaction on nutrition education

Level of satisfaction	Frequency(N=102)	Percentage
Least satisfied	20	19.6
Fairly satisfied	40	39.2
Satisfied	39	38.2
Very satisfactory	1	1.0
Most satisfactory	2	2.0
Total	**102**	**100.0**

IV.   Discussion

It was established that the women basically consumed diet dictated by what was locally available. These findings are consistent with those observed in a dietary pattern research in China which established that people do not eat isolated foods or individual nutrients but eat food in meals that tend to come from a dietary pattern that they grow up with[12]. In the current study there was generally a high consumption maize meal (79.4%) in form of*Ugali*(stiff porridge) and other dishes prepared from it because of its availability compared to other staples. Over eighty percent, of the respondents consumed between seventy, 70% and more than a hundred,100% of the RDA (2036.3mg) resulting in a diet that was not balanced.

Protein food consumption was majorly of plant origin as beans were most frequently consumed at 40% compared to other protein foods. It was also observed that green vegetables were most (74.4%) consumed by the respondents than any other vegetables owing to their availability. While it is observed that the pregnant women consume various sources of iron, folate and vitamin C rich foods, frequency of consumption of meats is however low. Increasing iron-rich flesh food consumption is thought to serve as an ideal dietary solution to improving iron intake; however, flesh foods are expensive[13]. Beans were indicated as frequently consumed in this study although many plant-based foods such as legumes and cereals are said to contain high levels of phytates which can inhibit dietary iron absorption[13].This therefore implies that anaemia among the women may be attributed to this legume rich diet.

A study of dietary patterns of pregnant women in West Africa also observed a diet mainly made of cereals and vegetables (more than 3 times daily) and to a lesser extent of oil from vegetable sources (more than twice daily)[3]. Results from the present study are also in agreement with a study on factors associated with adherence to iron/folate supplementation among pregnant women in Kiambu, Kenya[14]. The study established that majority of the respondents consumed green leafy vegetables for more than once per week but rarely consumed meats such as: liver, chicken and fish.

Despite availability of plenty of fruits in the region very low percentages (less than 10%) were consumed by the respondents. This may be attributed to respondents lacking knowledge on importance of consuming fruits or lack of money to purchase the fruits. This may also be attributed to the dietary patterns they grew up with[12].

Majority (84.5%) of the pregnant women interviewed took beverages such as tea, coffee and cocoa with their meals or directly after taking their meals. These beverages are known to contain polyphenolic compounds which decrease bioavailability of iron[13]. In tea, these compounds are tannic and gallic acid, which bind iron in the gut lumen and form chelates; thus, inhibiting iron absorption. In coffee, the main inhibitory compound is chlorogenic acid, which binds iron. A cup of tea with a meal reduces iron absorption by about 75% depending on the amount of phenolic compounds per cup. A cup of coffee with a meal has been shown to reduce iron absorption by about 60%[14].On nutrient intake of folic acid, calcium, and iron more than 40% of the respondents consumed less of the Recommended Daily Allowances (RDAs).The fact that there was a deficit of folic acid intake in the diet is a clear indication that if the mothers do not get supplements during their antenatal visits, they are likely to have poor pregnancy outcomes which includes preterm births, babies with low Hb and birth defects such as *spina bifida*[15].Deficiency of vitamin C for more than 20% (those consuming between 0-25% and 26-50% of RDA at 5% and 18% respectively) of the respondents could also lead to poor iron absorption even when the mothers take adequate amounts of iron. This is because vitamin C aids in iron absorption. These findings are consistent with those observed by Cuco',2006 that in addition to iron, several other micronutrients are important for Hb synthesis.

A study on utilization of maternal health services in Kenya, established that ANCs act as a key entry-point for implementing nutrition and health educational interventions that promote preventive health behaviours to improve maternal and neonatal health through better knowledge, attitudes and practices[16]. In Kenya, the World Health Organization (WHO) focus on antenatal care guidelines, which recommend at least four antenatal visits for women with low-risk pregnancy and provision of evidence-based content for each visit, were adopted and implemented in 2001[17].The current study concurred with these previous studies as it was indicated that, 41.6% of the respondents received their nutrition education information from the hospital. The information was

relayed during the routine ANC sessions at the hospital or during the guidance and counselling sessions. It was however noted that majority (83.3%) of the respondents reported for their booking visit in their third trimester making it a little difficult for them to improve on their dietary intake.

V.   Conclusions And Recommendations

In line with objectives of this study, it was established that most women at Kisii Level 5 have either an average or recommended consumption of protein, vitamin A, and energy respectively. There is however a deficit in Folic acid, Iron, calcium, and vitamin C consumption. Late reporting for ANC (majority of the respondents reported for the ANC in the third trimester) and inadequate nutrition education werethe major contributing factorsof poor dietary patterns among mothers attending ANC at Kisii Level 5 hospital. These include poor iron/folate consumption, consumption of tea, coffee and cocoa with iron and calcium rich foods.

Based on the results from this study, it was recommended that refresher courses on nutrition for other hospital staff dealing with pregnant women should be given to emphasize on ANC importance. Secondly, nutritional messages can also be advocated for through electronic and print media such as local Television programmes and radio stations. Thirdly, all pregnant women should be encouraged toconsumeiron rich foods together with those rich in vitamin C, such as citrus fruits and vegetables, to help enhance iron absorption and avoid drinking tea just after/before or during meal times.They should alsobe encouraged to grow or be empowered to access these foods.

There is need for a follow up study of all women attending the ANC to assess their nutritional status, Hb levels and dietary intake. An assessment of the pregnancy outcomes of the women attending the ANC should also be done especially those identified to be nutrient deficient.

Acknowledgements

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