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EFFECT OF DIETARY INTAKES ON PREGNANCY OUTCOMES: A COMPARATIVE STUDY AMONG HIV-INFECTED AND UNINFECTED WOMEN AT NYANZA PROVINCIAL GENERAL HOSPITAL, KENYA

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ABSTRACT

The effect of maternal dietary intakes on pregnancy outcomes was assessed in a descriptive, cross-sectional survey among women attending the *Prevention of Mother-to-Child Transmission* (PMTCT) of HIV program at Nyanza Provincial General Hospital (NPGH), Kenya. A Purposive sampling procedure was employed to select pregnant women (n=107) who had been tested for HIV into the study. Data on socio-demographic characteristics, health factors, dietary intakes and pregnancy outcomes were collected through an interview schedule from HIV-infected (n=48) and uninfected (n=59) pregnant women. Maternal dietary intakes were investigated using 24-Hour Diet Recalls and Food Frequency Questionnaires (FFQs). Pregnancy outcomes were assessed in terms of infants' birth weights, gestational age, birth complications and stillbirths. Statistical Package for the Social Sciences (SPSS) was used to analyze data for descriptive and inferential statistics while NutriSurvey computer program analyzed dietary data for nutrient intake levels. The results showed that protein $(p = 0.025)$ and vitamin B_{12} $(p = 0.021)$ intakes had significant correlation with infant's gestational age among the HIV-infected women while calorie $(p = 0.042)$, vitamin B_6 $(p = 0.048)$ and vitamin B_{12} $(p = 0.015)$ intakes significantly influenced infant's gestational age among uninfected women. Magnesium, iron and folate had a significant influence $(p < 0.05)$ on infant's gestational age in both HIV-infected and uninfected mothers. The results further revealed that HIV-infected women gave birth to infants of low birth weight (2.70 ± 0.3799 kg) compared with those uninfected (3.16 ± 0.5307 kg), while the gestational age of infants born to HIV-infected mothers was shorter (34.6 ± 3.24 weeks) compared with that of infants born to uninfected mothers (39.4 ± 2.21 weeks). The study concluded that both HIV and dietary intake have significant effects on pregnancy outcomes. It is imperative, therefore, that appropriate nutrition intervention be put in place to improve maternal health during HIV infection to ensure favourable pregnancy outcomes.

Key words: Dietary, HIV, pregnancy, outcomes, effect

BACKGROUND

Africa remains, by far, the continent most affected by Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS). By the end of 2004, there were about 36–43 million people living with HIV/AIDS throughout the world, of whom 25.4 million were estimated to be living in sub-Saharan Africa (SSA) [1]. In SSA, more than 50 percent of adults infected with HIV are women [1]. In Kenyan urban sentinel sites, HIV prevalence among antenatal women ranges between 4 and 10 percent in low seroprevalence sites and 20 and 35 percent in high seroprevalence sites [2]. Results from the Kenya Demographic and Health Survey indicate that the HIV prevalence among women aged 15-49 years is 8.7% while for men 15-49 years it is 4.6% [3]. A study in Kisumu revealed that HIV prevalence among sexually active 15-49 year-olds was six times greater among women than among men [4]. Nyanza Provincial General Hospital (NPGH) being one of the sentinel surveillance sites had a high HIV prevalence (22.7%) among pregnant women attending its PMTCT program.

Malnutrition and HIV work in tandem, with malnutrition weakening the immune system, increasing vulnerability to infection and hastening the progression of HIV to AIDS. On the other hand, HIV compromises the nutritional status of infected people and increases their susceptibility to other infections [5]. Low calcium intake increases the risk of pre-eclampsia and high blood pressure [5] whiles iron deficiency reduces the resistance to disease and causes fatigue and reduces productivity [6]. It is also possible that certain nutrient deficiencies may hasten the transmission of HIV [6]. Good maternal nutrition during both pregnancy and lactation is vital for the survival and wellbeing of the developing infant. For HIV- infected, women, the effects of malnutrition and HIV, result into poor clinical and pregnancy outcomes [7]. It is well established that the nutritional wellbeing of a healthy mother is critical for uncomplicated pregnancy and positive outcome [8].

In all women, malnutrition during pregnancy increases maternal morbidity and mortality and affects pregnancy outcomes. For the HIV-infected woman, the infection causes nutrient losses that increase nutritional requirements and the risk of malnutrition, both of which increase the risk of mother-to-child transmission (MTCT) of HIV [9]. Malnutrition leads to intra-uterine growth retardation and low birth weights [10]. Many women in Africa maintain pregnancy and lactation on dietary intakes lower than recommended and this is reflected in their lower weight gains. Nutritional status has even greater implications for the HIV-infected woman, who is at a higher risk of delivering pre-mature or low-birth weight infant and of being malnourished than the uninfected woman [10].

The endemic problem of malnutrition makes many women enter pregnancy already malnourished and consequently the nutritional status of an HIV infected woman before, during and after pregnancy may influence her own health as well as the risk of transmitting HIV to her infant [11]. For all women, improving nutritional status before and during pregnancy can help ensure adequate gestational weight gain and decrease the risk of premature delivery and low birth-weight. For an HIV-infected woman in particular, improving nutrition can help strengthen the immune system, prevent weight loss, prevent maternal malnutrition and delay disease progression, allowing the woman to remain productive and prolong her quality of life [12]. According to a study in South Africa, vitamin A supplementation reduces pre-term delivery and improves birth weight, neonatal growth, and reduces anaemia related diseases [13].

Randomised placebo case controlled studies by Coutsoudis and Pillay (1999) and Fawzi (2001) found marked decreases in prenatal mortality and an increase in birth weight that was associated with Vitamin A supplementation in pregnancy [14].
During pregnancy the requirement for energy, protein, and various micronutrients increase to meet the demands for adequate gestational weight gain, growth and development of the foetus and milk production [15]. The recommended increase in energy and protein requirements for healthy women is 285 kcal/day and 6 g/day respectively above non-pregnant levels. The current recommended increase in energy intake for HIV-infected pregnant and lactating women is 10 percent during the asymptomatic phase and 20-30% during the symptomatic phase. The additional energy (10 percent) is added to the basic energy requirement for a non-pregnant, woman of the same age and physical activity level [16].

Another study attributes the high incidence of anaemia in pregnancy to delay in clinic attendance and consequently delay in initiation of iron/folate supplementation, anti-malarial prophylaxis and routine deworming on the 16th week as recommended by the Ministry of Health [17]. This is also supported in a study by Gorduek (2001) who found that in developing countries, anaemia in pregnant women is due to poor dietary intake, poor absorption of iron and other vitamins such as folate and B_{12} and co-infections such as malaria and hookworm [18]. These studies focused more on supplements and, therefore, there is need to do research on the role of dietary intakes or supplements on pregnancy outcomes.

Wasting is a cause of stillbirth, preterm delivery, and intrauterine growth retardation (IUGR) [15], yet it is virtually unknown whether maternal dietary intakes play a role in the pathogenesis of these adverse outcomes among women attending the PMTCT program at NPGH. The study, therefore, sought to establish the extent to which dietary intakes affect pregnancy outcomes of the women attending the PMTCT program at Nyanza Provincial General Hospital.

METHODOLOGY

This study was a cross-sectional descriptive survey and employed quantitative data collection method. Purposive sampling procedure was used since it enables the researcher to select cases that are likely to be information rich with respect to the purpose of the study [19]. Ethical approval was obtained from the ethical review committee of Egerton University. Permission was sought from NPGH and a research permit obtained from the Ministry of Education Science and Technology before commencement of the study. Informed consent to participate in the study was obtained from the women by asking them to sign consent forms. Only those that had

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been tested and known their HIV status at the PMTCT program were involved in the study. Confidentiality was maintained by use of hospital identity numbers on stickers put on their antenatal cards. The sample size was apportioned according to the HIV prevalence of 23% among antenatal women attending PMTCT program at Nyanza Provincial General Hospital (NNGH). The sample was calculated according to the following formula by Nassiuma [20]. $n = n`N / N\text{-}1+n`$

Where: n = sample size

N= accessible population

n`= sample size for simple random sampling with replacement

But, $n` = Z\alpha_{/2} / d^2 \times p\,(1\text{-}p)$

$Z\alpha_{/2}$ = degree of confidence taken as 1.96 at 95%

d = level of statistical significance taken as 0.05

p = proportion of the target population estimated to have the characteristic being measured (taken as 0.23 at 23%)

Research data for this study was collected by means of questionnaires developed by the researcher. Data were collected on maternal socio-demography, health, dietary intakes and pregnancy outcomes. The questionnaires were standardised, pre-tested and adopted for this study as outlined in Mugenda & Mugenda [21]. The questionnaire on pregnancy outcome captured data in terms of baby's birth weight, gestational age, type and state of birth. To determine the content validity of the questionnaire, a panel of experts from Egerton University Foods, Nutrition & Dietetics Department examined the instrument and corrections were made according to their recommendations. The questionnaire was then piloted at Kisumu District Hospital, which had similar sample characteristics. To ensure the reliability of the questionnaire, the internal consistency technique was used, in which a score obtained from one item was correlated with scores obtained from other items in the questionnaire. Cronbachs Coefficient alpha (α) was then computed to determine how items correlated among themselves. The result obtained from the pilot study was α = 0.76, indicating that the items in the entire questionnaire were highly correlated hence it was adopted for the study.

Maternal socio-demography

Data on socio-demography were collected through interview and captured aspects of age, education level, household size and income. Others included marital status, housing and occupation.

Maternal health factors

Data on maternal heath factors were collected from mothers' antenatal cards. These included their HIV status, haemoglobin concentration, pregnancy related conditions and factors such as whether they had abortion or stillbirth cases before the current pregnancy.

24-Hour dietary recall and Food Frequency Questionnaire (FFQ)

Data on maternal dietary intakes were collected by use of 24-hour diet recall and Food Frequency Questionnaire based on the one used by the Kenya Demographic and Health Survey. In the 24-hour dietary recalls, the women were asked to recall everything they consumed in the previous 24 hours preceding the interviews. They were asked to describe the utensils they used for serving the foods to help in the estimation and standardization of portions [22]. A calibrated list obtained from UNICEF was used in estimating the quantity of food consumed. Volumes of solid food items were estimated by asking the respondents to depict the actual amount of food consumed in household measures. These volumes were then converted to volumes using water and measuring cylinders [23].

In the FFQs the women were asked how often they consumed certain foods from a given list of foods. During the assessment, consumption of food items at least once a day was considered high, once a week was considered medium, once a month was considered low and never was considered very low [24].

Maternal pregnancy outcomes

Health staff collected data on maternal pregnancy outcomes after they were appropriately trained by the researcher. Maternal pregnancy outcomes included infants' birth weight, gestational age, mode of delivery, type and state of birth. Birth weights were taken immediately after birth to the nearest 0.1 g by use of Seca 757 Baby Scale with digital display and Serial Interface (Model : 757; Serial: SBBSE-0003, Made in England). Gestational age was determined by the health staff by calculating the difference between the date of the last menstrual period at recruitment and the actual date of delivery. Mode of delivery was described as either normal, by episiotomy or caesarean section, while state of birth referred to whether the baby was born alive or dead.

Data analysis

Data were analysed for descriptive and inferential statistics using Statistical Package for the Social Sciences (SPSS for Windows Version 11.0) and NutriSurvey computer programs. The actual amount of amounts of food consumed by respondents were analysed for nutrients (calories, protein, vitamins and minerals) by use of NutriSurvey computer program. Descriptive statistics involved the use of frequencies, percentages, means, and distribution tables. Inferential statistics involved the use of multivariate regression analysis and independent sample t-test.

RESULTS

Demographic characteristics

Demographic characteristics of the women were analyzed (Table 1) and showed no significant differences in age *(p=0.2)* between the HIV-infected and uninfected women. However, there was significant difference in education level between the two groups (p = 0.004), with majority having attained primary education (62.5 % HIV-infected, 42.4% uninfected), while only a few (2.1% HIV-infected, 10.2% uninfected) had tertiary education. Marital status was distributed by HIV status and it is worth noting that all the women who were divorced were HIV-infected, while HIV prevalence was also reportedly high in widowed women (57.1%). On average the HIV-infected and uninfected women had household sizes of 4 and 5, respectively while monthly income was Kenya shillings 3810.42 and 5,247 in that order. Majority of the women were involved in domestic work (33.3% HIV-infected, 40.7% uninfected) while only a few (6.3% HIV-infected, 11.9% uninfected) were in salaried employment. There were significant differences in sources of livelihood between the two groups ($p = 0.00$). Majority of the women lived in semi-permanent houses (81.2% HIV-infected, 74.6% uninfected).

Other health characteristics

HIV-infected and uninfected women had a mean haemoglobin concentration of 9.52± 1.88 g/dl and 10.05 ± 1.54 g/dl, respectively (Table 2), while malaria incidences were higher (68.8%) in the HIV-infected group than uninfected (59.3%). Gestational diabetes (16.9%), hypertension (8.3%) and pre-eclampsia (23.7%) cases were reportedly higher in uninfected women. However, other infectious disease conditions like respiratory (14.6%), skin (29.2%) and gastrointestinal (14.6%) diseases were higher in HIV-infected women.

Nutrient intakes from 24-hour dietary recall

Results from 24-hour dietary intake (Table 3) showed significant difference in calorie intake between the HIV-infected and uninfected women studied *(p = 0.032).* HIV-infected women had lower intakes of fat (50.99g), folate (302.13 mg), Vitamin B_6 (1.84 mg) and iron (16.39 mg). Other nutrients that recorded lower intakes among the HIV-infected include zinc (12.92 mg) and magnesium (393.82 mg). However, intake of retinol (1389.93µg) and Vitamin B_{12} (85.10 mg) was higher among the HIV-infected group. Multivariate stepwise regression of each nutrient on birth weight showed no statistically significant effect ($\propto = 0.05$). Protein ($p = 0.025$) and vitamin B_{12} ($p = 0.021$) intakes had significant effect ($\propto < 0.05$) on infants' gestational age among the HIV-infected women while calorie ($p = 0.042$), vitamin B_6 (($p = 0.048$) and vitamin B_{12} ($p = 0.015$) intakes significantly influenced infants' gestational age.
The study also revealed that more HIV-infected women (95.8%) received iron/folate supplements compared to uninfected women (86.4%). Apparently, majority of the HIV-infected (83.3%) women received multivitamin supplements compared to the uninfected (11.9%), because it is a government policy to issue multivitamin supplements to HIV-infected mothers in pregnancy.

Food frequency

The results have been represented as food consumption frequency by serology cross tabulation (Table 4). The cereal that was most consumed was maize meal (42.7% HIV-infected, 42.5% uninfected) followed by rice (25.0% HIV- infected, 35.6% uninfected). Sugar consumption was reportedly high (79.7% HIV- infected, 64.2% uninfected) as was animal fat (54.2% HIV- infected, 74.6% uninfected). Other foods mostly consumed on a daily basis by the women were legumes (29.2% HIV- infected 28.8% Uninfected). Results show that consumption of foods rich in carbohydrates such as maize, rice and cassava were fairly high while that of fish was relatively low among the study subjects (2.1% HIV- infected), possibly due to its high price and the low economic status among the subjects. Other foods that also recorded low daily consumption frequency include plant oils (2.1% HIV-infected, 6.8% Uninfected), fruits (22.9% HIV-infected and 39.0% Uninfected). The foods that did not record any daily consumption frequency include dairy products, eggs, red meat, white meat and processed foods. This scenario could also be attributed to the fact that these products being animal protein sources are relatively more expensive compared to the plant source protein foods.

The food items consumed most frequently on a weekly basis by the subjects were rice (47.9% HIV-infected, 45.8% Uninfected), fruits (66.7% HIV-infected, 39.0% Uninfected) and eggs (47.5% HIV-infected, 45.5% Uninfected). Consumption of red meat was fairly high (33.3% HIV-infected, 30.5% Uninfected) as was white meat (33.3% HIV-infected, 37.1% Uninfected). Food items which were never eaten by the subjects were plant oils (52.1% HIV-infected, 59.3% Uninfected), dairy (33.3% HIV-infected, 16.9% Uninfected) and red meat (31.3% HIV-infected, 18.6% Uninfected).

Maternal pregnancy outcomes

The results (Table 6) reveal that HIV-infected women gave birth earlier at 37.02 ± 3.28 weeks compared with uninfected (39.41 ± 2.13) weeks. Independent sample t-test showed a statistically significant difference ($\propto = 0.05$) in gestational ages between the two groups ($p = 0.002$). Majority of the babies were born normally (77.1% HIV-infected, 88.1% uninfected) with only a few being born through caesarean section (22.9% HIV-infected, 11.9% uninfected). All the babies under study were born alive while those born through episiotomy were fewer (20.8% HIV-infected, 11.9% uninfected) compared to those born through the normal procedure. Independent sample t-test showed a statistically significant difference ($\propto = 0.05$) in mode of delivery ($p = 0.003$) and state of birth ($p = 0.008$) between the two groups; however, there was no statistically significant difference ($\propto = 0.05$) in type of birth ($p = 0.139$).

DISCUSSION

Findings from this study on the effect of maternal dietary intakes on pregnancy outcomes, agree with those of a study in the United States by Sloan *et al*. [25] that showed that mean protein intake of ≥85 g/day was associated with a 71 g decrement in birth weight ($n = 2163$, $p = 0.009$) compared to intermediate (50–84.9 g/day) average protein intake. The women under study recorded haemoglobin concentrations lower than the WHO recommended standard of 12 g/dl in pregnancy, which showed similar trend in a study by Ayisi *et al*.[26] which investigated the effect of dual infection with HIV and malaria on pregnancy outcome in Western Kenya [26]. A study of multivitamins plus iron and folic acid given during pregnancy to HIV-infected mothers in Tanzania, resulted in increased weight gain during pregnancy. The same study results showed a lowered risk of low birth weight and pre-term delivery among other positive outcomes [14]. Another study among HIV-infected pregnant women in Tanzania showed that there is also low haemoglobin associated with increased risk of pre-term delivery and low birth weight [27]. A study of maternal haemoglobin status of Indian women during pregnancy found that normal concentration of haemoglobin in all the 3 trimesters had a significant influence on birth weight [28]. Cases of gestational diabetes, hypertension and pre-eclampsia were higher in uninfected women, which could be attributed to their better nutritional status compared to their HIV-infected counterparts [16]. The lower energy intakes recorded among HIV-infected group could be attributed to the lower household income reported. Surveys show that micronutrient inadequacies in pregnant and lactating women are often seen to occur for iron, Vitamin A, folic acid, riboflavin and iodine [16].

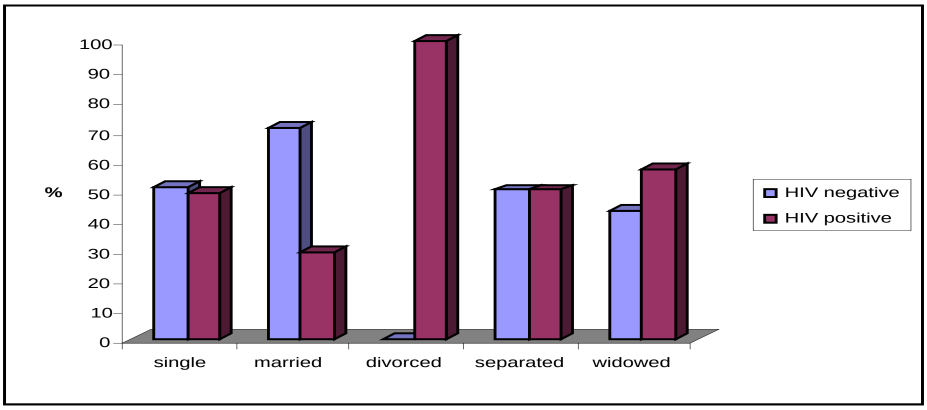

Figure 1: Maternal marital status by HIV status

The physiological changes that occur during pregnancy require extra nutrients and energy to meet the demand of an expanding blood volume, the growth of maternal tissue, the developing fetus, loss of maternal tissue at birth, and preparation for lactation [8]. Food consumption patterns are an important parameter in determining the main sources of nutrients for a given population and the rate at which they use the food. Cereals like rice, maize and cassava are important sources of calories and thus the main source of energy for the human body [29]. In a study in Durban, South Africa, pregnant women were randomly assigned to receive daily supplements of preformed Vitamin A and beta-carotene or placebo. The supplements had no effect on the risk of low birth weight, small-for-gestational age, or fetal death, but were associated with significant reduction in pre-term delivery of less than 37 weeks of gestation [13]. Supplementation was factored in the analyses of the 24-hour dietary recalls, which is why there was an apparent higher intake among the uninfected women. Cereal that was most consumed was maize meal (42.7% HIV-infected, 42.5% uninfected) followed by rice (25.0% HIV-infected, 35.6% uninfected). These results agree with findings by Nyambose *et al.*, who reported similar findings in Malawi [24]. Cereals like rice, maize and cassava are important sources of calories and thus the main source of energy for the human body [29]. Animal products and legumes are the main sources of protein which is very important in growth and development of human body [29]. High consumption of red meat is discouraged in HIV-infection due to its effect on the antioxidant vitamins and minerals [29]. The shorter gestational age and consequently low birth weight babies in HIV-infected women is attributed to intrauterine growth retardation (IGR), viral load (severity of HIV disease) [30]. Intrauterine growth retardation in these infants, results from lower maternal energy intake compared to increased needs from HIV and lower vitamin A (multivitamin) status**.** Another study among HIV-infected pregnant women in Tanzania showed that low maternal haemoglobin during pregnancy was associated with increased risk of pre-term delivery and low birth weight [14], It is important to note that a considerable number (22.9%) of the HIV-infected mothers delivered by caesarean section, which is recommended to reduce MTCT of HIV [9].

CONCLUSION

Results from this study indicated that nutrient intakes had an effect on birth outcomes of pregnant women attending the ante-natal clinic at Nyanza Provincial General Hospital in Kenya. Infants born to HIV-infected women had a lower birth weight and a shorter gestational age due to inadequate nutrient intakes and consequently inter-uterine growth retardation. The results showed a statistically significant difference in level of education and sources of livelihood between HIV-infected and Uninfected pregnant women. Maternal intakes of magnesium, folate and iron were correlated with infant's gestational age.

RECOMMENDATION

The women attending antenatal services at NPGH need interventions to improve socio-economic status. The government and private sector could empower them in this vein by providing small and micro-enterprise (SME) opportunities. Training in form of sensitization workshops and seminars need to be organized for health workers to bridge knowledge and skills gaps on issues of HIV and nutrition and to scale up nutrition education on the need for micronutrients in the diets of women attending ANC.

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Table 1: Demographic characteristics of the women under study

Variable	**HIV-infected** (n = 48)	**Uninfected** (n = 59)
Age (yrs) *P = 0.2*	23	22
Household size	5	4
Monthly income (Kshs)	5,247	3,810
Education	***Percent***	***Percent***
No education	20%	6%
Primary	42%	63%
Secondary	28%	29%
Tertiary	10%	2%
Occupation	***Percent***	***Percent***
No occupation	41	33
Casual worker	10	10
Domestic servant	5	10
Farmer	20	16
Businesswoman	12	13
Salaried employment	12	8
Housing	***Percent***	***Percent***
Permanent	25	19
Semi permanent	75	81

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Table 2: Maternal health characteristics

Health factors	HIV-infected (%)	Uninfected (%)
Gestational diabetes	16.9	8.3
Hypertension	6.8	4.2
Pre-eclampsia	23.7	14.6
Respiratory disease	8.5	14.6
Skin disease	5.1	29.2
GIT infections	13.6	14.6
Malaria	59.3	68.8
Total	**100**	**100**

Table 3: Maternal 24-hour nutrient intakes

Nutrients	HIV-infected (%)	Uninfected (%)	F-value	P-value
Energy (kcal)	1512	1678	4.701	0.032
Fat (g)	51	53	1.023	0.314
Protein (g)	76	68	0.283	0.596
Vitamin A (µg)	1390	926	0.464	0.497
Folate (mg)	302	312	0.013	0.908
Vitamin B_6 (mg)	2	2	2.371	0.127
Vitamin B_{12} (mg)	85	74	1.012	0.317
Iron (mg)	16	18	1.526	0.219
Zinc (mg)	13	15	2.435	0.122
Magnesium (mg)	394	398	0.010	0.970

Table 4: Multivariate regression of nutrient intake on birth weight

Nutrients	HIV-infected (*P-value*)	Uninfected (*P-value*)
Energy	0.830	0.409
Fat	0.744	0.421
Protein	0.757	0.837
Vitamin A	0.716	0.560
Folate	0.936	0.704
Vitamin B_6	0.716	0.947
Vitamin B_{12}	0.181	0.709
Iron	0.666	0.974
Zinc	0.595	0.879
Magnesium	0.743	0.820

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Table 5: Maternal food frequency

	Never (0)		Monthly once (1)		Weekly once (2)		Daily once (3)	
Food	**HIV +**	**HIV -**	**HIV +**	**HIV -**	**HIV +**	**HIV -**	**HIV +**	**HIV -**
Rice	22.9	18.5	4.2	8.5	47.9	45.8	25.0	35.6
Maize meal	14.6	6.8	-	5.1	37.5	45.8	47.9	42.5
Cassava	20.8	25.4	60.4	52.5	18.8	22.0	-	-
Mixed foods	25.0	18.6	56.3	44.1	18.8	37.3	-	-
Red meat	31.3	18.6	35.4	50.8	33.3	30.5	-	-
White meat	33.3	22.0	33.3	40.7	33.3	37.3	-	-
Fish	-	-	97.9	100	-	-	2.1	-
Eggs	14.6	15.3	39.6	47.5	45.5	37.3	-	-
Dairy	33.3	16.9	33.3	45.8	33.3	37.3	-	-
Legumes	20.8	13.6	22.9	20.3	27.1	33.9	29.2	28.8
Plant oils	52.1	59.3	31.3	18.6	4.2	10.2	2.1	6.8
Animal fats	10.4	3.4	2.1	1.7	33.3	20.3	54.2	74.6
Sugars	12.5	13.6	23.2	-	22.9	6.8	79.7	64.2
Green vegetables	14.6	15.3	-	-	33.3	23.7	52.1	6.1
Fruits	4.2	11.9	6.3	6.8	66.7	39.0	22.9	39.0
Other foods	14.6	6.8	39.6	54.2	45.8	27.1	-	11.9

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Table 6: Maternal pregnancy outcomes

Variable	**HIV-infected**	**Uninfected**
Birth Weight (kg)	3.15 ± 4.70	2.71 ± 0.61
Gestational age (weeks)	39.41 ± 2.13	37.02 ± 3.28
Mode of delivery	***Percent***	***Percent***
Normal	88	77
Caesarian	12	23
Episiotomy	12	21
State of birth	***Percent***	***Percent***
Born alive	100	100
Still birth	0	0

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